Total No. of Questions: 6   Total No. of Printed Pages:4

Enrollment No......................................

Faculty of Engineering
End Sem Examination Dec 2024
CA5EL52 Machine Learning
Programme: MCA / BCA-   Branch/Specialisation: Computer
MCA (Integrated)   Application

Duration: 3 Hrs.   **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

			Marks	BL	PO	CO	PSO
Q.1	i.	The father of machine learning is _____. (a) Geoffrey Everest Hinton (b) Geoffrey Hill (c) Geoffrey Chaucer (d) None of these	1	1	2	1	
	ii.	Which ONE of the following are regression tasks? (a) predict the age of a person (b) Predict the country from where the person comes from. (c) Predict whether the price of petroleum will increase tomorrow. (d) Predict whether a document is related to science	1	1	2	2	
	iii.	In k-NN algorithm, given a set of training examples and the value of k < size of training set (n), the algorithm predicts the class of a test example to be the (a) Most frequent class among the classes of k closest training examples (b) Least frequent class among the classes of k closest training examples (c) Class of the closest point (d) Most frequent class among the classes of the k farthest training examples	1	2	2	2	

OR	iii.	What is Principal Component Analysis? Explain the complete PCA process to reduce the dimensionality.	6	2	2	1	
Q.5	i.	Define bagging and boosting techniques in ensemble learning.	4	1	3	1	
	ii.	What are the methods used for cross-validation? Explain any two methods with suitable example.	6	1	3	2	
OR	iii.	Define the following: (a) Weak learner with a decision stump (b) Stacking	6	1	3	1	
Q.6		Attempt any two:					
	i.	What is neural network? Explain its relevance in the field of deep learning.	5	2	3	1	
	ii.	Explain any two of the following terms: (a) Perceptron (b) Feedforward process (c) Back propagation	5	2	5	1	
	iii.	What is Convolutional Neural Network? Also explain the significance of CNN in image and pattern recognition.	5	2	5	1	

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iv. Choose a disadvantage of decision trees among the following-   **1** 2 5 2
    (a) Decision trees are robust to outliers
    (b) Factor Analysis
    (c) Decision trees are prone to overfit
    (d) All of these

v. What is the name of the algorithm that can be used to find frequent itemset in a large dataset?   **1** 1 3 1
    (a) K-means   (b) PCA
    (c) AdaBoost   (d) Apriori

vi. Which unsupervised learning algorithm is used for dimensionality reduction?   **1** 1 3 1
    (a) Principal Component Analysis (PCA)
    (b) Decision tree
    (c) Naive Bayes
    (d) Linear Regression

vii. The purpose of using ensemble learning is to: **1** 1 5 2
    (a) Reduce overfitting and improve generalization
    (b) Increase training time and complexity
    (c) Decrease the number of models required
    (d) Eliminate the need for labeled data

viii. Suppose you have picked the parameter for a model using 10-fold cross validation (CV). Which of the following is the best way to pick a final model to use and estimate its error?   **1** 2 5 3
    (a) Pick any of the 10 models you built for your model; use its error estimate on the held-out data
    (b) Train a new model on the full data set, using the parameter you found; use the average CV error as its error estimate
    (c) Average all of the 10 models you got; use the average CV error as its error estimate
    (d) Average all of the 10 models you got; use the error the combined model gives on the full training set

ix. What is the purpose of pooling layers in a convolutional neural network (CNN)?   **1** 2 5 2
    (a) To reduce the size of the input data
    (b) To perform spatial down sampling
    (c) To extract the most important features
    (d) All of these

x. Which of the following is a common activation function used in the output layer for binary classification?   **1** 1 5 1
    (a) Sigmoid
    (b) ReLU (Rectified Linear Unit)
    (c) Tanh
    (d) Softmax

Q.2 i. What is supervised and unsupervised machine learning?   **2** 1 2 1

    ii. Write the differences between machine learning and deep learning.   **3** 2 2 2

    iii. Explain any five applications of machine learning.   **5** 2 2 1

OR iv. Explain the key difference between supervised and unsupervised learning. Provide one real-world example for each.   **5** 2 2 1

Q.3 i. Write the names of regression and classification algorithms.   **3** 1 3 2

    ii. How variance and bias affect the overfitting and underfitting of a model? Explain with suitable example.   **7** 2 3 3

OR iii. Explain the concept of Support Vector Machines (SVM) in supervised learning. Describe the objective and applications of SVM.   **7** 2 3 1

Q.4 i. What is the difference between K-means and Hierarchical clustering?   **4** 2 2 1

    ii. How Linear discriminant analysis (LDA) is used to solve multi-class classification problems in machine learning? Write steps to explain the process.   **6** 2 2 2

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Marking Scheme
CA5EL52 (T) Machine Learning (T)

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Q.1	i)	A	**1**
	ii)	C	**1**
	iii)	A	**1**
	iv)	C	**1**
	v)	D	**1**
	vi)	A	**1**
	vii)	A	**1**
	viii)	B	**1**
	ix)	D	**1**
	x)	A	**1**

Q.2	i.	1 mark for each definition	**2**
	ii.	1 mark for each difference	**3**
	iii.	1 mark for each application explanation	**5**
OR	iv.	4 mark for each difference 1 mark for example	**5**

Q.3	i.	Regression	1 Mark	**3**
		classification	2 Marks	
	ii.	Example 4 marks Explain 3 marks		**7**
OR	iii.	Concept 2 marks, Objective 2 marks, Applications 3 marks		**7**

Q.4	i.	1 mark for each difference	**4**
	ii.	Define 2 marks, Steps 4 marks	**6**
OR	iii.	Define PCA 2 marks, PCA Process 4 marks	**6**

Q.5	i.	Bagging 2 marks, Boosting 2 marks	**4**
	ii.	Definition 2 marks, Example 4 marks	**6**
OR	iii.	Each A and B is of 3 marks	**6**

Q.6			
	i.	Define 1 mark, Explain 4 Marks	**5**
	ii.	Any two term will allot 2.5 marks	**5**
	iii.	Define 2 marks, Significance 3 marks	**5**

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