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

Faculty of Engineering
End Sem Examination Dec-2023
EC3ET05 Introduction to Machine Learning
Programme: B.Tech.   Branch/Specialisation: EC

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.

Q.1   i.   In general, to have a well-defined learning problem, we must identity   **1** which of the following:
      (a) The class of tasks
      (b) The measure of performance to be improved
      (c) The source of experience
      (d) All of these

   ii.   In regression, the equation that describes how the response variable (y)   **1** is related to the explanatory variable (x) is-
      (a) The correlation model
      (b) The regression model
      (c) Used to compute the correlation coefficient
      (d) None of these

  iii.   In which ANN, loops are allowed?   **1**
      (a) FeedForward ANN   (b) ForwardFeed ANN
      (c) FeedBack ANN   (d) None of these

   iv.   What is perceptron?   **1**
      (a) A single layer feed-forward neural network with pre-processing
      (b) An auto-associative neural network
      (c) A double layer auto-associative neural network
      (d) A neural network that contains feedback

   v.   In SVM, the dimension of the hyperplane depends upon which one?   **1**
      (a) The number of features
      (b) The number of samples
      (c) The number of target variables
      (d) All of these

vi. In Hyper plane, f(x)=sign(w*x+b) where 'w' is a- **1**
(a) Constant   (b) Vector   (c) Distance   (d) None of these

vii. In machine learning what is the primary goal of dimensionality **1**
reduction techniques like PCA?
(a) To increase model interpretability
(b) To reduce the size of the training dataset
(c) To perform unsupervised learning
(d) To visualize data relationships

viii. Which algorithm is commonly used for anomaly detection? **1**
(a) Decision Tree   (b) K-Means Clustering
(c) Isolation Forest   (d) Naive Bayes

ix. Which layer type is typically used to capture sequential dependencies **1**
in an RNN?
(a) Input layer   (b) Hidden layer
(c) Output layer   (d) Activation layer

x. Which element in reinforcement learning defines the behaviour of the **1**
agent?
(a) Policy   (b) Reward Signal
(c) Value Function   (d) Model of the environment

Q.2   i.   Define machine learning and list its various types. **2**

ii. Discuss the concept of inductive bias and its role in the generalization **3**
ability of machine learning models.

iii. What is simple linear regression? Provide the formula for linear **5**
regression. Explain the meaning of each parameter in the formula with
the help of an example.

OR iv. Explain the fundamental idea behind logistic regression. How does it **5**
handle binary classification problems?

Q.3   i.   Define and draw perceptron model. **2**

ii. Write and explain back propagation algorithm with the help of suitable **8**
example.

OR iii. What is multi-layer perceptron? Describe the architecture of a multi- **8**
layer perceptron, including the role of input, hidden, and output layers.

Q.4   i.   Explain the difference between binary and multi-class regression **3**
problem with the help of suitable example.

ii. Define the Support Vector Machine (SVM) algorithm. Briefly explain **7**

the concept of the margin in SVM, and its significance in
classification.

OR iii. What is the role of kernels? Classify the different type of Kernel and **7**
describe situations where each type of kernel might be advantageous.

Q.5   i.   What is Unsupervised learning? Define clustering in unsupervised **4**
learning.

ii. Define dimensionality reduction machine learning. Explain the basic **6**
idea behind Principal Component Analysis (PCA).

OR iii. Explain the k-means clustering algorithm with the help of suitable **6**
example.

Q.6   Attempt any two:

i.   Provide a brief overview of reinforcement learning and its core **5**
components

ii. What is Recurrent Neural Network (RNN)? Describe its basic **5**
structure and how it processes sequential data.

iii. Define deep learning and explain its significance in modern machine **5**
learning.

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