



**BK BIRLA CENTRE FOR EDUCATION**  
SARALA BIRLA GROUP OF SCHOOLS  
SENIOR SECONDARY CO-ED DAY CUM BOYS' RESIDENTIAL SCHOOL  
POST MID-TERM (2024-25)



**ARTIFICIAL INTELLIGENCE (843)**  
**MARKING SCHEME**

**Class : XI SCIENCE/COMMERCE/ARTS**  
**Date : 09-01-2024**  
**Admission No.:**

**Duration : 1 Hr**  
**Max. Marks : 25**  
**Roll No.:**

**Section-A**

1. The term 'Machine Learning' was coined by : 1  
(a) Alan Turing (b) John MacCarthy (c) **Arthur Samuel** (d) Rossum
2. \_\_\_\_\_ learning mimics the network of neurons in the brain. 1  
(a) Machine (b) **Deep** (c) Reinforcement (d) Supervised
3. Clustering is used to : 1  
(a) Predict the category of a new data point.  
(b) **Organize data points into meaningful groups based on similarities.**  
(c) Classify data points into predefined categories. (d) Reduce the noise in a dataset.
4. The correlation coefficient (R) can range from: 1  
(a) 0 to 1 (b) **-1 to +1** (c) -2 to +2 (d) None of the above
5. **Assertion / Reason Questions:** 1  
**Statement 1:** AI is a broad field that encompasses machine learning.  
**Statement 2:** Machine Learning models can only learn from labelled data.  
(a) **Statement 1 is correct, but statement 2 is incorrect.**  
(b) Statement 1 is incorrect, but statement 2 is correct.  
(c) Both the statements are correct.  
(d) Both the statements are incorrect.
6. **Statement 1:** Unsupervised learning can be used to identify fraudulent transactions on a credit card. 1  
**Statement 2:** Unsupervised learning helps find patterns in unlabeled data.  
(a) Statement 1 is correct, but statement 2 is incorrect.  
(b) Statement 1 is incorrect, but statement 2 is correct.  
(c) **Both the statements are correct.**  
(d) Both the statements are incorrect.
7. Statement 1: Regression analysis can be used to identify causal relationships between variables. 1  
Statement 2: Regression models the relationships between a dependent variable and one or more independent variables.  
(a) Statement 1 is correct, but statement 2 is incorrect.  
(b) **Statement 1 is incorrect, but statement 2 is correct.**  
(c) Both the statements are correct.  
(d) Both the statements are incorrect.

8. Statement 1: Classification models are always perfect at predicting the category of a new data point. 1  
 Statement 2: Classification models learn patterns from training data to make predictions.  
 (a) Statement 1 is correct, but statement 2 is incorrect.  
**(b) Statement 1 is incorrect, but statement 2 is correct.**  
 (c) Both the statements are correct.  
 (d) Both the statements are incorrect.
9. **Competency-Based Question:** 1  
 Asmita is developing an AI-driven recommendation system for a retail e-commerce platform. What type of machine learning method might she have used to:  
 a) Train the model with details of past purchases, user interactions, and product ratings ?  
**b) Identify groups of similar users or products based on their browsing behaviour ?**
10. Suppose you are sales manager tasked with forecasting sales for the upcoming quarter. 1  
 Describe how you would use linear regression in this scenario, including the data you would collect and the steps involved in the analysis.

Ans: Step 1: Data Collection  
 Historical Sales Data: Identify potential independent variables  
 External Factors: Gather data on external factors that might affect sales, such as market trends, industry growth rates, or changes in consumer behavior.  
 Step 2: Data Preparation  
 Data Cleaning:  
 Determine which independent variables (features) are most relevant to predicting sales. Split the dataset into a training set and a test set (commonly an 80/20 or 70/30 split).

### Section- B

11. Reinforcement Learning is a feedback-based Machine Learning technique in which an agent learns to behave in an environment by performing the actions and seeing the results of actions. Explain with an example. 2

Ans: **Reinforcement Learning (RL)** is a feedback-based Machine Learning technique where an agent interacts with an environment, learns by performing actions, and optimizes its behaviour based on the outcomes of these actions. Unlike supervised learning, RL does not rely on labelled data. Instead, the agent uses a trial-and-error approach to maximize rewards and minimize penalties.

**Key Components of Reinforcement Learning:**

Agent: The decision-maker or learner.

Environment: Everything the agent interacts with.

Action (A): The choices available to the agent.

State (S): The current situation or condition of the environment.

Reward (R): Feedback from the environment after the agent performs an action (positive for desirable actions, negative for undesirable actions).

Policy ( $\pi$ ): The strategy the agent uses to determine its next action based on its current state.

Value Function: Estimates the total future reward an agent can expect from a state.

**Example: Teaching a Robot to Play a Game**

Imagine you are training a robot to play chess:

Environment: The chessboard and the rules of the game.

Agent: The robot learning to play chess.

State (S): The current configuration of pieces on the board.

Action (A): The possible moves the robot can make.

Reward (R):

Positive Reward: Capturing an opponent's piece or checkmating the opponent.

Negative Reward: Losing a piece or making an invalid move.

Goal: Maximize the total reward by learning strategies that lead to winning.

12. Give two advantages and disadvantages of each of Machine Learning. 2

Ans: **Advantages of Machine Learning:**

Automation of Tasks:

Machine learning algorithms can automate repetitive tasks, reducing the need for human intervention and freeing up time for more complex activities.

Machine learning can analyse large volumes of data quickly and accurately, identifying patterns and trends that may not be immediately apparent.

**Disadvantages of Machine Learning:**

Data Dependency:

Machine learning models require large amounts of high-quality data to perform well.

Many machine learning models, especially deep learning algorithms, can be complex and difficult to interpret. This "black box" nature makes it challenging to understand how decisions are made, which can be problematic in applications where transparency is critical, such as healthcare or finance.

13. Give at-least four applications of Machine Learning in daily life. 2

Ans: **Personalized Recommendations:**

Platforms like Netflix, Amazon, and Spotify use machine learning algorithms to analyze user behavior and preferences.

**Voice-activated virtual assistants** such as Siri, Google Assistant, and Alexa rely on machine learning to understand and process natural language.

**Fraud Detection:**

Financial institutions and online payment platforms use machine learning algorithms to detect fraudulent activities.

**Image and Facial Recognition:**

Machine learning is used in applications like facial recognition for unlocking smartphones, security systems, and social media tagging.

14. Differentiate between Correlation Coefficient and Regression Coefficient. 2

Ans: Correlation and regression coefficients are both used to quantify the relationship between two variables, but they differ in a number of ways:

Purpose

Correlation measures the strength and direction of the relationship between two variables, while regression models and understands the relationship between the variables. Regression can also be used to predict values and analyze the impact of predictors.

Variables :In correlation, the variables are interchangeable, while in regression, one variable is random and the other is fixed.

Causality :Correlation does not capture causality, while regression is based on causality.

Graphical representation :Correlation is represented by a single point, while regression is represented by a line.

Equation:Correlation is a single statistic, while regression produces an equation.

Coefficient

The regression coefficient, represented by the parameter  $\beta$ , indicates the amount by which a change in x must be multiplied to give the corresponding average change in y.

15. Explain KNN (K-Nearest Neighbour) ? List two advantages and disadvantages of it. 2

Advantages	Limitations
Simple implementation	High memory requirements
No training phase	Computationally expensive for large datasets
Adaptable to new data	Sensitive to irrelevant features
Effective for small datasets	Struggles with imbalanced classes

16. List the types of Clustering ? Explain each type with example. 2

Ans: Centroid-based clustering, Density-based clustering., Distribution-based clustering. Hierarchical clustering.

### Section-C

17. Explain K-Means clustering ? List two applications of it. Write two advantages and two disadvantages of it. 3

Ans: KMeans is used across many fields in a wide variety of use cases; some examples of clustering use cases include customer segmentation, fraud detection, predicting account attrition, targeting client incentives, cybercrime identification, and delivery route optimization.

Advantages:

Simple and easy to implement, Fast and efficient, Scalability, Flexibility

Disadvantages:

Sensitivity to initial centroids, Requires specifying the number of clusters, Sensitive to outliers

\*\*\*\*\* BEST OF LUCK \*\*\*\*\*