

# **Assignment-01 : Machine Learning (BCA-6th Semester)**

**Subject Code:** BCA-606

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**Session:** 2026 (Even)

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## **Q1. What is Machine Learning and why it is important? (1 Mark)**

Machine Learning is a branch of Artificial Intelligence (AI) that enables computers to learn automatically from data and improve their performance without being explicitly programmed.

In Machine Learning, systems analyze past data, identify patterns, and make decisions based on experience.

It is important because it helps in automation, accurate prediction, and solving complex real-life problems efficiently.

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## **Q2. Define Association. (1 Mark)**

Association is a data mining technique used to discover relationships among variables in large datasets.

It identifies items or events that frequently occur together.

Association is widely used in market basket analysis to understand customer buying behavior.

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## **Q3. What is Clustering? (1 Mark)**

Clustering is an unsupervised machine learning technique used to group similar data objects into clusters.

Data points within the same cluster are more similar to each other than to those in other clusters.

It is useful for pattern discovery and data analysis.

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## **Q4. What is CSV? (1 Mark)**

CSV stands for Comma Separated Values.

It is a simple file format used to store large datasets in tabular form.

Each row represents a record and each value is separated by a comma.

CSV files are easy to read and widely used in Machine Learning.

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## **Q5. What is Feature Extraction? (1 Mark)**

Feature extraction is the process of selecting and transforming important information from raw data. It reduces the number of input variables while keeping useful data. Feature extraction improves accuracy and reduces model complexity.

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## **Q6. What is missing data? (1 Mark)**

Missing data refers to the absence of values in one or more attributes of a dataset. It may occur due to human errors, system failure, or incomplete data collection. Missing data must be handled properly to avoid incorrect results.

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## **Q7. How do you evaluate the effectiveness of feature extraction? (2 Marks)**

The effectiveness of feature extraction is evaluated by analyzing model performance after applying it. If the accuracy, precision, or recall of the model improves, feature extraction is considered effective. Reduction in dimensionality and faster training time also indicate good feature extraction. Visualization techniques such as plots can help analyze feature quality.

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## **Q8. Explain the difference between PCA and LDA. (2 Marks)**

PCA (Principal Component Analysis) is an unsupervised dimensionality reduction technique. It focuses on maximizing variance in the dataset without considering class labels.

LDA (Linear Discriminant Analysis) is a supervised technique that considers class information. It maximizes class separability and is mainly used for classification tasks.

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## **Q9. Explain the types of Machine Learning with examples. (4 Marks)**

Machine Learning can be classified into three major types based on learning approach.

### **1. Supervised Learning**

In supervised learning, the dataset contains labeled input and output data. The model learns by comparing predicted output with actual output. Examples include Linear Regression, Logistic Regression, and Decision Trees. It is mainly used in classification and prediction problems.

## **2. Unsupervised Learning**

In unsupervised learning, the dataset does not contain labels.  
The algorithm finds hidden patterns automatically.  
Examples include K-means clustering and Association rule mining.  
It is used for grouping and pattern discovery.

## **3. Reinforcement Learning**

In reinforcement learning, an agent learns by interacting with the environment.  
The agent receives rewards or penalties based on actions.  
Examples include robotics, self-driving cars, and game AI.

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# **Q10. Mention applications and goals of Machine Learning. (4 Marks)**

## **Applications of Machine Learning**

1. Email spam filtering
2. Recommendation systems such as Netflix and Amazon
3. Face recognition and speech recognition
4. Medical diagnosis and disease prediction
5. Fraud detection in banking

## **Goals of Machine Learning**

1. To enable systems to learn from experience
  2. To make accurate predictions from data
  3. To automate intelligent decision-making
  4. To improve performance continuously with new data
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# **Q11. Explain any six features of Machine Learning. (6 Marks)**

1. **Learning Capability:** Machine Learning systems learn from historical data and improve results.
  2. **Automation:** Reduces human effort by performing tasks automatically.
  3. **Pattern Recognition:** Identifies hidden trends in large datasets.
  4. **Scalability:** Capable of handling big and complex data efficiently.
  5. **Accuracy Improvement:** Performance improves with more data.
  6. **Adaptability:** ML systems adapt to new situations and data changes.
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## **Q12. Differentiate Supervised, Unsupervised and Reinforcement Learning. (6 Marks)**

### **Supervised Learning**

- Uses labeled training data
- Output is known beforehand
- Used for prediction and classification
- Examples: Linear Regression, Support Vector Machine

### **Unsupervised Learning**

- Uses unlabeled data
- Output is unknown
- Used for clustering and association
- Examples: K-means, Apriori Algorithm

### **Reinforcement Learning**

- Learns through rewards and penalties
- Agent interacts with environment
- Used for decision-making problems
- Examples: Game playing AI, robotics

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 All answers are written in simple English with slightly extended explanation for better marks.