A. Short Answer type -

1. Why is the rule-based approach considered static?

Ans - The Rule-based Approach is considered static because it enables machines to perform specific tasks and generate desired outputs. Developers manually define a set of rules that determine how the machine processes data and responds to various scenarios.

2. What is a major advantage of the learning-based approach over the rule-based approach?

Ans - A learning-based approach in AI allows the machine to train on data and adapt its model dynamically. It modifies itself based on data changes, ensuring adaptability and handling exceptions effectively whereas Rule-based Approach enables machines to perform specific tasks and generate desired outputs.

3. What is the primary difference between Clustering and Classification?

Ans - Classification is a rule-based AI model that groups data into categories.

Clustering is a machine learning technique that divides a dataset into distinct clusters or categories using algorithmic patterns.

4. Explain the term Convolutional Neural Networks (CNN).

Ans - The Convolutional Neural Network is part of the Neural Networks that is primarily used for image related tasks. It extracts spatial features from data. It is used in Image classification (e.g., object detection), Medical imaging (e.g. tumor detection), Facial recognition, Autonomous vehicles, etc.

5. What do you mean by a Testing Dataset?

Ans - The testing data set is a collection of data provided to a machine learning model to evaluate how well it has learned to make predictions. Just like how a teacher gives a test to students after teaching a concept to assess their understanding and identify any gaps.

6. Name any four real-world applications of Neural Network.

Ans - Real-world applications of Neural Networks are fraud detection, recommendation system, facial recognition, chatbots and virtual assistant, vegetable price prediction, etc.

B. Long answer type questions.

1. Explain the three basic layers of Artificial Neural Network.

Ans - ANN is made up of three basic layers - Input, Hidden and Output.
The input layer accepts the inputs,
The hidden layer processes the inputs.
The output layer produces the result where each layer tries to learn from the computed weights.

2. Explain any four applications of machine learning in our daily lives.

Ans - Spam Email Filtering: Machine learning algorithms learn to identify and filter out spam emails by analysing the patterns in sender's email address and content.

Image Recognition: When you upload a picture, an automatic tag recognition system used by applications like Facebook, suggests people to tag. It uses a face recognition algorithm for the same.

Speech Recognition: We all love to speak out our messages to Siri, Google assistant, Amazon Alexa etc. Thes speech recognition devices use machine learning to understand spoken language and convert speech to ter and respond accordingly.

Object Classification: ML model learns to identify and name objects in images and videos. For For example, if you show it pictures of animals like cats and dogs, it learns what each looks like. Later, when you give it a new picture, it can tell whether it's a cat or a dog.

3. Differentiate between supervised and unsupervised learning models.
Ans - **Supervised Learning**
Supervised Learning is a type of machine learning where a model is trained on a labelled dataset.

Example - how a teacher helps students learn.

Unsupervised learning
Unsupervised learning approach works on an unlabelled dataset. The machine receives random data with no prior knowledge available to the trainer.

Example - imagine a photo gallery app that automatically organises a user's photos based on their content.

4. Explain the term association rule with the help of an example.
Ans - Association rule learning is an unsupervised machine learning technique used to **find interesting relationships or patterns** between variables in large datasets. It's most commonly used in **market basket analysis**, where businesses analyze customer purchase habits.

Consider a supermarket example wherein

- Customer A buys bread, butter, and milk
- Customer B buys rice, bread, and butter

Based on the purchase pattern of customers A and B, can you predict any Customer X who buys bread will most probably buy?
"If customer A buys 'Milk', they are likely to buy 'Cereal' or 'Bread'."

5. What is regression? Give an example.
Ans - Regression is a mathematical approach to find a relationship between two or more variables. It works with continuous data.

Car Price Prediction: This model estimates the selling price of a car using various factors, like fuel type, years of usage, number of previous owners, distance driven (in kilometers), transmission type (manual or automatic).