1. What is the concept of human learning? Please give two examples.

**Ans:** Gaining new knowledge is called as learning. Humans learn by reading, writing, listening. It is part of personal development. Motor learning, Verbal learning, Concept learning are examples of human learning. Humans learn to identify objects and compare things.

2. What different forms of human learning are there? Are there any machine learning equivalents?

**Ans:** Different Types of human learning are:Verbal learning, Concept learning, Motor learning, Discrimination learning, Problem solving, Attitude learning

Human learning is equivalent to machine learning. Machines after training can perform problem solving, they can compare the objects, abstraction and generalisation.

3. What is machine learning, and how does it work? What are the key responsibilities of machine learning?

Ans: Machine learning is augmented AI. With machine learning we can develop a kind of system which solves problems with the help of machines as well as human beings.

Machine learning is a subset of artificial intelligence. It teaches machines to think like humans.

It works by exploring data and identifying patterns, and involves minimal human intervention.

The key responsibilities of machine learning:

Data gathering

Data Preprocessing

EDA

Feature Engineering

Visualization

Model Buildings

4. Define the terms "penalty" and "reward" in the context of reinforcement learning.

**Ans:** An agent is a term related to reinforcement learning algorithm. It learns by interacting with its environment. The agent receives rewards by performing correctly and penalties for performing incorrectly. The agent learns without intervention from a human by maximizing its reward and minimizing its penalty.

5. Explain the term "learning as a search"?

**Ans:** Search space is a space consisting of set of sentences. The search space is called as hypothesis space. The algorithm learns by searching foe a sentence which best describes the data. In either case, a generality relation usually determines the structure of the search space.

6. What are the various goals of machine learning? What is the relationship between these and human learning?

**Ans**: **A] Goals of machine learning:**

1.Gaining insights from the given data

2. Classification of data into two classes or multi classes

3.Anomaly Detection

4.Recommendation to user

**B] Relationship with human learning**

1**.** Human beings learn by observation, inception and experiment. Same way machine learning models learn when they are properly trended.

2. Human beings can make predictions, supervised machine learning algorithms can make

Predictions.

7. Illustrate the various elements of machine learning using a real-life illustration.

**Ans:** 1. Online fraud detection - PayPal is using ML tools to distinguish between legitimate or illegitimate transactions taking place between the buyers and sellers.

2.Self-Driving Cars and Automated Transportation - Boeing 777 pilot uses ML tools for automation. The navigation issues are solved by use of google maps.

3. Home Security and Smart Homes - AI-powered alarms and cameras are used for home security.

4. Product Recommendations – Users can get recommendations of movies, books and other products with the help of ML tools.

8. Provide an example of the abstraction method.

**Ans:** Abstraction in Python is defined as the process of hiding the real implementation of an application from the user.

Example:

from xyz import XYZ, abstractmethod

class Hexagone(XYZ):

    @abstractmethod

    def noofsides(self):

        pass

class Circle(Polygon):

    # overriding abstract method

    def noofsides(self):

        print("I have 3 sides")

S = Hexagone()

S.noofsides()

C = Circle()

C.noofsides()

9. What is the concept of generalization? What function does it play in the machine learning process?

**Ans:** Generalization can be defined as the ability to apply the method used to solve one problem to other new problems. For example Identifying a fruit by its shape ,colour and taste.

In machine learning generalization plays an important role. Once a ma model is trained for a set of data with a specific purpose, it can be used for the same purpose for new, unseen data.

10.What is classification, exactly? What are the main distinctions between classification and regression?

**Ans:** Classification means assigning a label to the data according to its relevant category.

Classification is used to predict a discrete class label output for an example. Regression is used for predicting a continuous quantity output for an example.

11. What is regression, and how does it work? Give an example of a real-world problem that was solved using regression.

**Ans:** Regression is a supervised machine learning algorithm is used to predict continuous values. The goal of the regression model is to plot a best-fit line.

Regression finds out the relationship between two variables, how one variable affects another variable.

**The applications of regression in real world:**

1. Predictive analytics: Finding out future opportunities and risks. For example, predicting future ratings of restaurants, predicting stock prices.

12. Describe the clustering mechanism in detail.

**Ans:** Cluster is group of objects having similar characteristics. In terms of machine learning

Clustering is the unsupervised learning technique. The algorithm uses unlabelled data and separates the data into various groups. The grouping is done based on the similarities and dissimilarities of the objects. Then labels are assigned to each group.

13. Make brief observations on two of the following topics:

i. Machine learning algorithms are used

ii. Studying under supervision

iii. Studying without supervision

iv. Reinforcement learning is a form of learning based on positive reinforcement.