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

Ans : It is the form of learning which requires higher order mental processes like thinking, reasoning, intelligence, etc. we learn different concepts from childhood. For example, when we see a dog and attach the term 'dog', we learn that the word dog refers to a particular animal.

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

Ans : There are three main types of learning: classical conditioning, operant conditioning, and observational learning.

Machine learning equivalents: supervised learning, unsupervised learning, and reinforcement learning.

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

Ans : Machine learning is a data analytics technique that teaches computers to do what comes naturally to humans and animals: learn from experience. Machine learning algorithms use computational methods to “learn” information directly from data without relying on a predetermined equation as a model.

key responsibilities of machine learning :

1. Study and transform data science prototypes.
2. Design machine learning systems.
3. Research and implement appropriate ML algorithms and tools.
4. Develop machine learning applications according to requirements.
5. Select appropriate datasets and data representation methods.
6. Run machine learning tests and experiments.

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

Ans : The Reward Function is an incentive mechanism that tells the agent what is correct and what is wrong using reward and punishment. The goal of agents in reinforcement learning is to maximize the total rewards. Sometimes we need to sacrifice immediate rewards in order to maximize the total rewards.

Reinforcement means you are increasing a behavior, and punishment means you are decreasing a behavior. Reinforcement can be positive or negative, and punishment can also be positive or negative. All reinforcers (positive or negative) increase the likelihood of a behavioral response.

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

Ans : Concept learning can be viewed as the task of searching through a large space of hypotheses implicitly defined by the hypothesis representation. The goal of this search is to find the hypothesis that best fits the training examples.

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

Ans : The goal of ML, in simples words, is to understand the nature of (human and other forms of) learning, and to build learning capability in computers. To be more specific, there are three aspects of the goals of ML.

1. To make the computers smarter, more intelligent. The more direct objective in this aspect is to develop systems (programs) for specific practical learning tasks in application domains.
2. To dev elop computational models of human learning process and perform computer simulations. The study in this aspect is also called cognitive modeling.
3. To explore new learning methods and develop general learning algorithms independent of applications

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

**8. Provide an example of the abstraction method.**

Ans : Abstraction is used to hide the internal functionality of the function from the users. The users only interact with the basic implementation of the function, but inner working is hidden. User is familiar with that "what function does" but they don't know "how it does."

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

Ans : Generalization refers to your model's ability to adapt properly to new, previously unseen data, drawn from the same distribution as the one used to create the model.

In machine learning, generalization is a definition to demonstrate how well is a trained model to classify or forecast unseen data.

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

Ans : In machine learning, classification refers to a predictive modeling problem where a class label is predicted for a given example of input data. Examples of classification problems include: Given an example, classify if it is spam or not.

The most significant difference between regression vs classification is that while regression helps predict a continuous quantity, classification predicts discrete class labels.

**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 statistical method used in finance, investing, and other disciplines that attempts to determine the strength and character of the relationship between one dependent variable (usually denoted by Y) and a series of other variables (known as independent variables).

Agricultural scientists often use linear regression to measure the effect of fertilizer and water on crop yields.

**12. Describe the clustering mechanism in detail.**

Ans : In clustering, a group of different data objects is classified as similar objects. One group means a cluster of data. Data sets are divided into different groups in the cluster analysis, which is based on the similarity of the data. After the classification of data into various groups, a label is assigned to the 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.**

Ans : **Machine learning algorithms :** Broadly, there are 3 types of Machine Learning Algorithms

1. Supervised Learning

How it works: This algorithm consist of a target / outcome variable (or dependent variable) which is to be predicted from a given set of predictors (independent variables). Using these set of variables, we generate a function that map inputs to desired outputs. The training process continues until the model achieves a desired level of accuracy on the training data. Examples of Supervised Learning: Regression, Decision Tree, Random Forest, KNN, Logistic Regression etc.

2. Unsupervised Learning

How it works: In this algorithm, we do not have any target or outcome variable to predict / estimate. It is used for clustering population in different groups, which is widely used for segmenting customers in different groups for specific intervention. Examples of Unsupervised Learning: Apriori algorithm, K-means.

3. Reinforcement Learning:

How it works: Using this algorithm, the machine is trained to make specific decisions. It works this way: the machine is exposed to an environment where it trains itself continually using trial and error. This machine learns from past experience and tries to capture the best possible knowledge to make accurate business decisions. Example of Reinforcement Learning: Markov Decision Process