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

Acquiring knowledge, skills, behavior, and feelings through experiences interactions, etc. Example riding a bicycle, through experience a person will gain skills of balancing and coordinating with the cycle. How to paddle, steer, brakes on time, controlling speed. Learning to play music instrument, from no knowledge to gaining knowledge through experience by watching tutorials, guidance from teachers, then timing

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

Social Learning- Learning from demonstration

Cognitive learning – Natural Language understanding

Experience learning - Reinforcement learning where an agent learns from train and error

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

Machine learning is a subset of AI. It makes predictions or decisions without being programmed. It uses statistics for making models, these model finds patterns and apply them to new unseen data (structured data).

It works like first Data collection then data processing then model selection, model training, model evaluation, and model deployment (Predictions). Key responsibilities are Data preparation, feature engineering, model - selection – training – evaluation – validation - deployment

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

If a model predicts right answer then it is rewarded with some points like 5 10 etc, if a model predicts the wrong answer then it got a penalty of some points like 20 30 etc. Mostly penality points are more as compared to the rewards.

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

Searching through a hypothesis to find the best model or solution.

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

Predictions, Pattern recognition, Anomaly detection, Optimization

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

Datasets, Data Preprocessing, Feature extraction, Model selection, Model training, Model evaluation, Hyperparameter, Model testing, and Model deployment.

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

Suppose classifying an image if it is a cat or a dog then the abstraction method can be used to abstract features that are relevant.

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

Generalization is the ultimate goal of machine learning, to predict on unseen data or new data and give optimum results is the goal. Important functions are Performance on unseen data, avoiding overfitting, model evaluation, and adapting to new data.

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

Classification is basically catagorizing data on the basis of features. Main difference between is output in classification output will be like true false, 0 - 1, Yes – No, cat – dog, etc basically it will be classify. In regeression output will be numeric values 12,3,5,1,3,4.. etc basically numeric values or continuous values.

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

It is a supervised machine-learning technique that predicts continuous values or numeric values. Regression model finds the best parameters that minimizes the error (differences between Actual and predicted). After training, the model finds the pattern or best values of the parameters.

Example:- Prediction of the price of the house.

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

It groups similar data points together based on patterns and similarities

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

**i. Machine learning algorithms are used**

Machine learning algorithms are used in machine learning. These algorithms finds patterns in the data and make predictions

**ii. Studying under supervision**

**iii. Studying without supervision**

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

In reinforcement learning agent learn from trail and error process. The goal is to learn optimal policy that maximizes the long term reward.