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

Ans: Human Learning Systems is an alternative approach to public management which embraces the complexity of the real world, and enables us to work effectively in that complexity.  
For example, Learning to drive a motor-car, typewriting, singing or memorizing a poem or a mathematical table etc.

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

Ans: **Three Major Types of Learning**

* Learning through association - Classical Conditioning.
* Learning through consequences – Operant Conditioning.
* Learning through observation – Modeling/Observational Learning.

Yes, Supervised, Unsupervised and Reinforcement learning are the machine learning equivalents of Human Learning.

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

Ans: Machine learning is a form of artificial intelligence (AI) that teaches computers to think in a similar way to how humans do: Learning and improving upon past experiences. It works by exploring data and identifying patterns, and involves minimal human intervention.

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

Ans: **Reward** - In reinforcement learning, the agent is rewarded for taking controls that lead to successful states. The rewards can be immediate, such as receiving a point for each step taken in the right direction, or they can be delayed, such as receiving a point at the end of the episode if the goal was reached.

**Penalty –** Penalty is either adding or removing something that would stop a response from happening again.

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

Ans: Learning can be viewed as a search through the space of all sentences in a concept description language for a sentence that best describes the data. Alternatively, it can be viewed as a search through all hypotheses in a hypothesis space.

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

Ans: **The main goal of machine learning is to give computers the ability to learn itself without being explicitly programmed. It identifies patterns from preprocessed data and make decisions with minimal human intervention.**

In the current scenario we are creating huge amount of raw data each and every second (even now while writing this post) and a lot of useful information can be extracted from it. So, with the help of machine learning we prepare models and the preprocessed data is fed to learn the patterns from it and based on this accurate future predictions are made, which can *serve as a solution to a variety of business complexities problems, and predict complex customer behaviors.*

Regardless of whether the learner is a human or machine, the basic learning process is similar. It can be divided into four interrelated components:

**Data storage, Abstraction, Generalization, Evaluation.**  
 But Humans acquire knowledge through experience either directly or shared by others.Machines acquire knowledge through experience shared in the form of past data

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

8. Provide an example of the abstraction method.

Ans: Abstraction “displays” only the relevant attributes of objects and “hides” the unnecessary details. For example, when we are driving a car, we are only concerned about driving the car like start/stop the car, accelerate/ break, etc.

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

Ans: Generalization is the ability for a student to *perform a skill under different conditions* (**stimulus generalization**), the ability to *apply a skill in a different way* (**response generalization**), and also to *continue to exhibit that skill over time* (**maintenance**).

A machine learning algorithm must generalize from training data to the entire domain of all unseen observations in the domain so that it can make accurate predictions when you use the model.

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

Ans: In machine learning, classification is a predictive modeling problem where the class label is anticipated for a specific example of input data. For example, in determining handwriting characters, identifying spam etc.

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: A regression is a statistical technique that relates a dependent variable to one or more independent (explanatory) variables. A regression model is able to show whether changes observed in the dependent variable are associated with changes in one or more of the explanatory variables.

For example, it can be used to predict the relationship between reckless driving and the total number of road accidents caused by a driver, or, to use a business example, the effect on sales and spending a certain amount of money on advertising.

12. Describe the clustering mechanism in detail.

Ans: Clustering is the task of dividing the population or data points into a number of groups such that data points in the same groups are more similar to other data points in the same group than those in other groups. In simple words, the aim is to segregate groups with similar traits and assign them into clusters.

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.