**1.Explain the term machine learning, and how does it work?   
Explain two machine learning applications in the business world.   
What are some of the ethical concerns that machine learning applications could raise?**

**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.

Two ML Application in Business world are- (i) chatbot, (ii) spam Emain / SMS detection.

The legal and ethical concerns of Machine Learning (ML) include privacy and surveillance, bias or discrimination, and potentially the philosophical challenge is the role of human judgment.

**2. Describe the process of human learning:**

**i. Under the supervision of experts**

**ii. With the assistance of experts in an indirect manner**

**iii. Self-education**

**3. Provide a few examples of various types of machine learning.**

**Ans:** The three major recognized categories of machine learning are:  
(i) **supervised learning:** Most popular approach among the three different types of ML techniques. Algorithms are trained on top of a labled dataset to predict a particular target variable (continuous or classified).  
e.g. Face Recognition, Spam Classification etc.  
  
(ii) **unsupervised learning:** Mostly used for Segmrntation or grouping any unlabled dataset. E.g. recomendation system, buying habbits in e-comerce etc.  
(iii) **reinforcement learning:** It is a Reward-Penalty based approach. E.g. Video gaming, Simulation of robots used in factories etc.

**4. Examine the various forms of machine learning.**

**5. Can you explain what a well-posed learning problem is? Explain the main characteristics that must be present to identify a learning problem properly.**

**Ans: Well Posed Learning Problem** – A computer program is said to learn from experience E in context to some task T and some performance measure P, if its performance on T, as was measured by P, upgrades with experience E.

Any problem can be segregated as well-posed learning problem if it has three traits –

* Task
* Performance Measure
* Experience

**6. Is machine learning capable of solving all problems? Give a detailed explanation of your answer.**

**Ans:** Machine learning is not the answer to all problems. Given the usefulness of machine learning, it can be hard to accept that sometimes it is not the best solution to a problem.

**7. What are the various methods and technologies for solving machine learning problems? Any two of them should be defined in detail.**

**Ans:** There are mainly 3 methods to solve any machine learning problem statement: a) Supervised , b) Unsupervised and c) Reinforcement.  
For each of the above three methods there are multiple tech tools that we can use directly. E.g. pandas, Matlab, Jupyter Notebook, Numpy, PyTorch, Scikit Learn, TensorFlow etc.

**8. Can you explain the various forms of supervised learning? Explain each one with an example application.**

**Ans:** Supervised learning can be further classified into two types:  
a) Regression and b) Classification  
 In Regression we have the output as continuous variable and we need to train our model and predict the future results. But in Classification the target feature is not continuous but discrete or Classified or contains two or more specific classes.

**9. What is the difference between supervised and unsupervised learning? With a sample application in each region, explain the differences.**

**Ans:** In Supervised ML we train our model with labled data or data that contains specific output for any set of Inputs. Based on that training and learning our model predicts with any future data where the output is absent for similar set of inputs.

On the other hand, in Unsupervised ML, model is trained with unlabled data or data that don’t have any specific output for set of inputs. Examinig the internal pattern and similarities of the data depending on the algorithm used, our model creates seperate groups or clusters.

**10. Describe the machine learning process in depth.**

**a. Make brief notes on any two of the following:**

**MATLAB is one of the most widely used programming languages.**

**ii. Deep learning applications in healthcare**

**iii. Study of the market basket**

**iv. Linear regression (simple)**

**11. Make a comparison between:-**

**1. Generalization and abstraction**

### **Abstraction**

Abstraction is the skill of understanding the world by thinking about the characteristics that things possess rather than those things themselves.

### **Generalization**

Generalization is the application of abstract characteristics to an entire class of things.

For example, when Galileo studied the way that a ball travels through the air, he made experiments using an actual ball.  
However, he was not interested in that actual ball itself. He was interested in motion, an abstract characteristic. He used the actual ball and its motion to study motion in the abstract.

Galileo could generalize about the motion of physical objects because he correctly identified physical objects as the class of things that his observations about motion apply to.

**2. Learning that is guided and unsupervised**

**3. Regression and classification**

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