PART - A

(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Express the Markov property mathematically.
2. Give clear difference between episodic and *continuous* tasks of Markov process.
3. Why dimensionality reduction is required for a dataset?
4. Which cost function is used in logistic regression and why?
5. Write names of different types of clustering methods.
6. What is the use of attribute selection measure in decision tree classifier.
7. Define singular value decompositions.
8. What is Deep learning?
9. What is support vector in SVM?
10. Give name of u-filter feature selection methods.

(Analytical/Problem solving questions)

Attempt any five questions. **(5×4=20)**

1. What do you understand about " Bellman equation for value function". Give example.
2. Give merits and demerits of filter and wrapper feature selection methods.
3. Discuss about frequent pattern, support and confidence of a association rule with example.
4. Explain following with respect to multilayer network
   a) Weights and Biascs
   b) Use of Activation functions.
5. What is the use of confusion matrix. Define all the related terms of a confusion matrix.
6. Discuss various types of splits of a attribute in a decision tree classification algorithm.
7. What is overfitting problem in Machine learning algorithm. Give solutions for it.

PART - C

(Descriptive/Analytical/Problem solving/Design questions))

Attempt any three questions. **(3×10=30)**

1. Explain K-nearest neighbor method. Consider a binary classification problem with two classes C1 and C2. Class lables of ten other training set instances sorted in increasing order of their distance to an instance.

   x is as follows: $\{C1, C2, C1, C2, C2, C2, C1, C2, C1, C2\}$.

   How will a $K=3$ nearest neighbour classifier classify the instance x
2. Suppose you are given following set of training examples. Each attribute can take on one of three nominal values: a b, or c.

A1	*A2*	*A3*	*Class*
a	*c*	*a*	*C1*
c	*a*	*c*	*C1*
a	*a*	*c*	*C2*
b	*c*	*a*	*C2*
c	*c*	*b*	*C2*

   a) How would a Naive Bayes classifier classify the example $A1 = a, A2 = c, A3 = b$? Show all steps.
   b) How would a Name Bayes classifier classify the example $A1 = c, A2 = c, A3 = a$? Show all steps.

3. Explain f-p Growth algorithm for frequent pattern generation. Give suitable example and all computational steps with diagrams.

4. A neural network takes two binary values inputs, $x1, x2 \in \{0,1\}$ and activation function is the binary threshold functions $\begin{pmatrix} h(z)=1 & if & z>0 \\ 0 & & otherwise \end{pmatrix}$

Design a neural network to compute the AND Boolean function. Consider the truth table for of AND Boolean functions. weights are {2,2) and Biase is -3.

5. Write short notes on following

a) Model based reinforcement learning.

b) K - means clustering algorithm

c) Single linkage and complete linkage clustering algorithm with example.