Roll No: _____

Computer Science and Engineering Department

Thapar Institute of Engineering and Technology, Patiala

Course: Machine Learning **Code: UML501**

Time: 3 Hrs; Date: 12.12.2019 **MM: 100**

Note: Attempt ALL questions. Answer must be in brief and point to point.

1 a)	How can SVM be used to classify the non-linear dataset? Explain the process of classifying non-linear dataset with SVM with an example.	5
b)	What is the significance of the Random Forest Classifier? How it is different from a tree classifier?	5
c)	Define Machine Learning in terms of Experience (E), Task (T) and Performance (P) and identify E, T and P for placement prediction task.	5
d)	In order to build a robot for fighting with enemies, which type of machine learning model will you use? Justify your answer and elaborate all important components of building a robot for fighting with enemies.	5
2 a)	For the given regression dataset, find the best independent feature by using filter approach-based selection.	10

F_1	F_2	F_3	Output
7	10	7	8
8	16	6	10
8	10	6	3
2	17	7	6
7	17	5	10
1	7	1	4
8	6	10	6
1	9	5	6
6	7	10	4
9	6	3	2

b)	Predict the class for the given unknown instance for the following training dataset by using a Naïve Bayes classifier. Indicate all the intermediate steps.	10

PTO

PTO

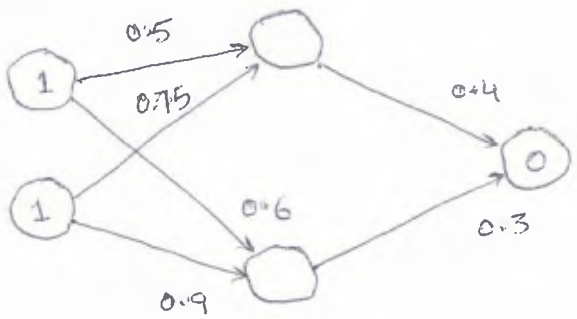
Unknown Instance

Owns Home	Married	Gender	Employed	Credit rating	Class
Yes	No	Male	Yes	A	?

Training dataset

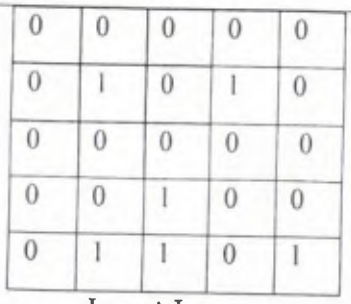
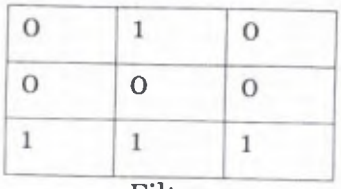
Owns Home	Married	Gender	Employed	Credit rating	Class
Yes	Yes	Male	Yes	A	II
No	No	Female	Yes	A	I
Yes	Yes	Female	Yes	B	III
Yes	No	Male	No	B	II
No	Yes	Female	Yes	B	III
No	No	Female	Yes	B	I
No	No	Male	No	B	II
Yes	No	Female	Yes	A	I
No	Yes	Female	Yes	A	III
Yes	Yes	Female	Yes	A	III

3 a) Build a neural network for the following case study by taking initial weights given in the figure below: 10



Assume that a sigmoid function is being used as the activation function. Show the first iteration (forward as well as back propagation) only.

PTO

b)	Draw the feature map for the following by considering stride 1.  Input Image  Filter	5
c)	Apply Max pooling by considering matrix size of 3×3 and stride 1. 	3
d)	Differentiate between ANN and Deep Learning.	2
4 a)	What is the need of elitism in Genetic algorithm?	5
b)	How GA can be applied to find to global minima. Explain each stage of GA with respect to find a global minimum out of multiple local minima for a given model?	10
c)	What are different techniques for selection of a parent?	5
5 a)	As a data scientist you have analysed that in a regression problem the dependent variable is not changing linearly with respect to an independent variable. Which regression technique will you use to build the model and why?	5
b)	What are the applications of explanation based learning?	5
c)	Explain the concept of Inductive and Analytical learning with examples. Compare both techniques in a tabular manner.	10
d)	Let us suppose that there are 200 pages available on the Internet for Machine Learning. The search on this term returns total 210 pages, out of which 190 belongs to Machine Learning. Calculate the precision and recall for our algorithm.	5