JAIPURIA INSTITUTE OF MANAGEMENT, NOIDA

PGDM / PGDM (M) / PGDM (SM)

FIFTH TRIMESTER (Batch 2020-22)

END TERM EXAMINATIONS, JANUARY, 2022, SET - I

Course Name	MACHINE LEARNING (MLA)	Course Code	BA-501
Max. Time	**2 hours**	Max. Marks	**40 MM**

INSTRUCTIONS:

a. Students are required to work on their own personal Laptop. This is an open book exam
b. Attempt all the questions on a single Jupyter Notebook
c. The data for the exam can be downloaded from Moodle.
d. Write down your Roll no., course name and code on top of Jupyter Notebook
e. Save your Jupyter notebook with .ipynb extension and as pdf file
f. Upload both the files on Moodle.
g. Label the files as ML_roll no.

Q 1: Read the following case

Case: AKSIS Bank

AKSIS bank is relatively young bank and is growing rapidly in terms of overall customer acquisition. Majority of these are liability customers with varying sizes of relationship with the bank. The customer base of asset customers is quite small, and the bank wants to grow this base rapidly to bring in more loan business. Specifically, it wants to explore ways of converting its liability customers to personal loan customers.

A campaign the bank ran for liability customers last year showed a healthy conversion rate of over 9% successes. This has encouraged the Retail Marketing department to devise smarter campaigns with better target marketing.

While designing a new campaign, can we model the previous campaign's customer behavior to analyze what combination of parameters make a customer more likely to accept a personal loan? The data is given in an Excel file "Aksis Bank". The data description is given below:

ID	Customer ID
Age	Customer's age in completed years
Experience	#years of professional experience
Income	Annual income of the customer ($000)
ZIPCode	Home Address ZIP code.
Family	Family size of the customer
CCAvg	Avg. spending on credit cards per month ($000)
Education	Education Level. 1: Undergrad; 2: Graduate; 3: Advanced/Professional
Mortgage	Value of house mortgage if any. ($000)
Personal Loan	Did this customer accept the personal loan offered in the last campaign?
Securities Account	Does the customer have a securities account with the bank?
CD Account	Does the customer have a certificate of deposit (CD) account with the bank?
Online	Does the customer use internet banking facilities?
CreditCard	Does the customer use a credit card issued by Aksis Bank?

Analyze the dataset in python and answer the following questions:

1. Perform data preparation and exploration. (10 marks)
2. Balance the dataset by up sampling the minority class (5 marks)
3. Split the balanced data into train and test set. (2 marks)
   (*Note: Random State value while splitting the data should be the last two digits of your roll no.)
4. Apply any two classification techniques out of which one should be the ensemble method. (5 marks)
5. Use the grid search mechanism to find most optimal values of the parameters for the two algorithms. (5 marks)
6. Find the best model on ROC_AUC score (5 marks)
7. Find the feature importance from one of the models used above. And report the topmost important features. (5 marks)
8. Give the managerial implication of the results. (3 marks)

Note: You are required to illustrate every output of the above questions with the interpretation mentioned as comments on the Jupyter notebook.