

MSC.III/01.21.001

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**M.Sc DEGREE THIRD SEMESTER EXAMINATION IN COMPUTER SCIENCE
(SOFT COMPUTING), JANUARY 2021
18-323-0301 MACHINE LEARNING**

Time: 3 Hours

Maximum Marks: 50

**(Answer ANY FIVE questions)
(All questions carry EQUAL marks)**

- I. a) What are the various types of Machine Learning systems? Explain. (6)
b) Suppose some physicians are interested in finding out a patient's probability of having liver disease if he is an alcoholic. From the existing data of patients, 10% of patients entering the clinic have liver disease. The data also tells that 5% of the clinic's patients are alcoholics and among those patients diagnosed with liver disease, 7% are alcoholics. Based on the above data, the physician's claim that if the patient is an alcoholic, their chances of having liver disease is 14%. Do you agree with this claim? Justify. (4)
- II. a) Differentiate between overfitting and underfitting. Explain how bias and variance affects the overfitting and under fitting with the help of bulls-eye diagram. (5)
b) Explain the process of regularization in detail. (5)
- III. a) Differentiate between Linear Regression and Logistic Regression by considering the cost functions and loss functions used in each case. (5)
b) Explain how SVM can be used as a classifier. Also explain the concept of kernel tricks used in SVM. (5)
- IV. a) Explain the concept of K means algorithm with merits and demerits. (5)
b) Apply K Means algorithm on given data. For K=3, Use $C_1(2)$, $C_2(16)$, $C_3(38)$ as initial cluster centers.
Data: 2, 4, 6, 3, 31, 12, 15, 16, 38, 35, 14, 21, 23, 25, 30. (5)

V. a) Consider the following two Fuzzy Sets

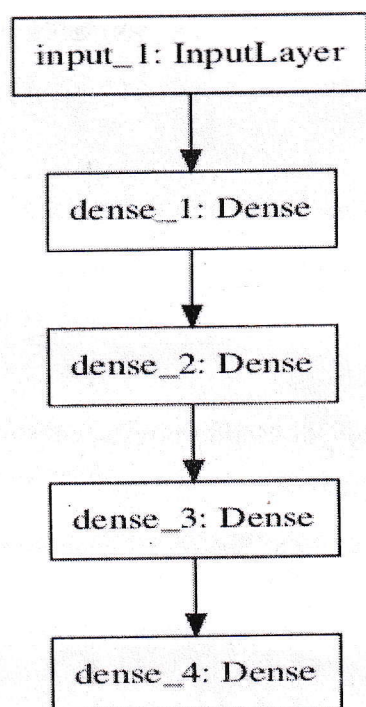
$$A = \left\{ \frac{0.1}{0} + \frac{0.5}{1} + \frac{1}{2} + \frac{0.6}{3} + \frac{0.2}{4} \right\}$$

$$B = \left\{ \frac{0.2}{0} + \frac{0.5}{1} + \frac{1}{2} + \frac{0.7}{3} + \frac{0.1}{4} \right\}$$

Find i) $A \cup B$ ii) $A \cap B$ iii) $\overline{A \cap B}$ (5)

b) Explain the concept and components of Fuzzy Inference system with a suitable diagram.(5)

VI. Write a python code to build the Deep Learning model as per the following diagram. In input layer you can consider a dataset consisting of 70K 28×28 grey scale images of 10 handwritten numeric digits. In the hidden layers dense-1, dense-2, and dense-3 you can consider 100, 200, 100 neurons respectively having relu activation function. In the output layer use a softmax activation function. Also mention necessary scikitlearn and keras libraries needed to implement the model. (10)



VII. What are recurrent neural networks? Explain Long Short-Term Memory with a neat architecture. (10)
