Code - 5006

G. S. Mandal's

Maharashtra Institute of Technology, Aurangabad

(An Autonomous Institute)

END SEMESTER EXAMINATION

First Year M.Tech(CST) -April/May 2022

Course Code : MTC103 **Course Name : Machine Learning Techniques**

Duration : 2 Hrs **Max. Marks : 50** **Date : 09/04/2022**

Instructions :

i) All questions are compulsory

ii) Assume suitable data wherever necessary and clearly state it

iii) Figures to the right indicate full marks

Q. 1	**Solve/Answer Any Five (Marks : 10)**			
	Questions	Marks	CO	BL
a)	What do you mean by a well –posed learning problem? State the important features that are required to well –define a learning problem.	2	CO1	1
b)	When is regression used?	2	CO1	2
c)	What Is the Role of Activation Functions in a Neural Network?	2	CO1	1
d)	How can we make k-means robust to outliers?	2	CO1	2
e)	Why instance based learning algorithm sometimes referred as Lazy learning algorithm?	2	CO1	2
f)	Suppose a convolutional neural network is trained on ImageNet dataset (Object recognition dataset). This trained model is then given a completely white image as an input. The output probabilities for this input would be equal for all classes. True or False? Why?	2	CO1	2
Q. 2	Which attribute is the best classifier in decision tree learning algorithm? Suppose S is a collection of training example days described by attributes including Wind, which can have the values Weak or Strong. 1. Assume S is a collection containing 14 examples of some Boolean concept, including 9 positive and 5 negative examples (9+,5-). Calculate the entropy of S relative to this Boolean classification. 2. Of these 14 examples, suppose 6 of the positive and 2 of the negative examples have Wind=Weak and the remainder have Wind=Strong. Calculate the information gain due to sorting the original examples by the attribute Wind.	8	CO2	3

<table>
<tr><td>Q. 3</td><td>The sales of a company (in million dollars) for each year are shown in the table below.
<table><tr><td>x (year)</td><td>2005</td><td>2006</td><td>2007</td><td>2008</td><td>2009</td></tr><tr><td>y (sales)</td><td>12</td><td>19</td><td>29</td><td>37</td><td>45</td></tr></table>
a) Find the least square regression line y = a x + b.
b) Use the least squares regression line as a model to estimate the sales of the company in 2012</td><td>8</td><td>CO3</td><td>3</td></tr>
<tr><td>Q. 4</td><td>What is – i) Neural Network and ii) Deep Learning? Compare Neural Network and Deep Learning.</td><td>8</td><td>CO4</td><td>3</td></tr>
<tr><td>Q. 5</td><td>Suppose hypothesis h commits r = 10 errors over a sample of n = 65 independently drawn examples.
1.What is the 90% confidence interval (two-sided) for the true error rate?
2.What is the 95% one-sided interval (i.e., what is the upper bound U such that errorD(h) <= U with 95% confidence)?
3.What is the 90% one-sided interval?

OR</td><td>8</td><td>CO5</td><td>3</td></tr>
<tr><td>Q. 5</td><td>How to find the difference in error of two hypotheses with the help of hypothesis testing? Explain it with example.</td><td>8</td><td>CO5</td><td>3</td></tr>
<tr><td>Q. 6</td><td>Cluster documents in multiple categories based on tags, topics, and the content of the documents. This is a very standard classification problem, for this which is a highly suitable algorithm for this purpose. How this algorithm works. Explain.

OR</td><td>8</td><td>CO6</td><td>4</td></tr>
<tr><td>Q. 6</td><td>An application where the aims to recover the data sequence where the next sequence of the data can not be observed immediately but the next data depends on the old sequences. Taking the above intuition into account which model can be used? Explain it with example.</td><td>8</td><td>CO6</td><td>4</td></tr>
</table>