Exam.Code:1007
Sub. Code: 7373

2063
M.E. (Information Technology)
Third Semester
MEIT-3103: Machine Learning

Time allowed: 3 Hours **Max. Marks: 50**

NOTE: Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.

x-x-x

<table>
<tr><td>1</td><td>(a) What are the various supervised learning techniques?
(b) What is the use of maximum likelihood estimation?
(c) What is vanishing gradient problem in neural networks?
(d) Which techniques can be used to classify nonlinearly separable data?
(e) Write name of various clustering techniques.</td><td>(10)</td></tr>
<tr><td></td><td>Part A</td><td></td></tr>
<tr><td>2</td><td>Calculate mean square error for the data shown in the table below. Where $\theta_0 = 15$, $\theta_1 = 5$. Update these weights using gradient descent method for one iteration.
<table><tr><td>X</td><td>Y (target)</td></tr><tr><td>2</td><td>50</td></tr><tr><td>4</td><td>80</td></tr><tr><td>9</td><td>120</td></tr></table></td><td>(10)</td></tr>
<tr><td>3.</td><td>(a) What is overfitting and under fitting? How issue of overfitting is resolved?
(b) What is the sigmoid function and its use in classification?</td><td>(5)
(5)</td></tr>
<tr><td>4.</td><td>Design the neural network for AND, NOT and OR gates.</td><td>(10)</td></tr>
<tr><td colspan="3">Part B</td></tr>
<tr><td>5.</td><td>Perform K means clustering for the following data
X = { (2,3), (3,4), (7,8),(10,11)}</td><td>(10)</td></tr>
<tr><td>6.</td><td>(a) How the Gaussian mixture model is different from K means clustering?
(b) What is the use of hidden markov model (HMM)? Design a HMM for sunny- cloudy- rainy day dummy example as hidden states and light wear- umbrella- raincoat as visible states. Assume probabilities by yourself and calculate probability of given hidden state. Take necessary assumptions.</td><td>(4)
(6)</td></tr>
<tr><td>7</td><td>Write note on the following
(a) PCA
(b) LDA</td><td>(10)</td></tr>
</table>

x-x-x