

NATIONAL INSTITUTE OF TECHNOLOGY, KURUKSHETRA
THEORY EXAMINATION

Question Paper

Month and year of the Examination: **Nov-2021**

Programme: **B.Tech.**

Subject: - **Machine Learning**

Number of Questions to be Attempted: **5**

Total No. of Questions: **5**

Total No. of Pages used: **2**

Semester: - **7th Semester**

Course No: - **ITPC-41**

Maximum Marks: - **50**

Time Allowed: - **2½ Hours**

Course Coordinator Email & Mobile No.: rka15969@gmail.com, +919416570828

mk.verma113@gmail.com, +919996395619

Note: - There will be internal choice in Question no. 2

Ques 1 (a)	How KNN is different from K-means clustering?	(3)															
Ques 1 (b)	What is Machine Learning? Explain different perspectives and issues in machine learning.	(3)															
Ques 1 (c)	Given the following data, use PCA to reduce the dimension from 2 to 1. <table border="1"><tr><td>Feature</td><td>D1</td><td>D2</td><td>D3</td><td>D4</td></tr><tr><td>X</td><td>4</td><td>8</td><td>13</td><td>7</td></tr><tr><td>Y</td><td>11</td><td>4</td><td>5</td><td>14</td></tr></table>	Feature	D1	D2	D3	D4	X	4	8	13	7	Y	11	4	5	14	(4)
Feature	D1	D2	D3	D4													
X	4	8	13	7													
Y	11	4	5	14													
Ques 2	Why is Naïve Bayes Naïve? What is Bayes' Theorem? How is it useful in machine learning context? What is prior and likelihood here? Explain with the help of an example. OR	(10)															
Ques 2 (a)	What is overfitting problem at training time? How can it be resolved?	(2)															
Ques 2 (b)	What are Kernel functions? Write down four types of kernels in SVM.	(4)															
Ques 2 (c)	Calculate weights ($Y= W* X$) of gradient descent for given input data. <table border="1"><tr><td>X</td><td>Y</td></tr><tr><td>1</td><td>2</td></tr><tr><td>2</td><td>4</td></tr><tr><td>3</td><td>6</td></tr><tr><td>4</td><td>8</td></tr></table>	X	Y	1	2	2	4	3	6	4	8	(4)					
X	Y																
1	2																
2	4																
3	6																
4	8																
Ques 3 (a)	Use K Means clustering to cluster the following data into two groups. Assume cluster centroid are $m_1=2$ and $m_2=4$. The distance function used is Euclidean distance. { 2, 4, 10, 12, 3, 20, 30, 11, 25 }.	(4)															
Ques 3 (b)	Define Entropy and Information Gain. Also explain use of Entropy in Decision tree.	(3)															

Ques 3 (c)	What do you mean by Convolutional Neural Network? Why do we prefer convolutional Neural Network over Artificial Neural Network for image data as input?	(3)																																								
Ques 4 (a)	What is a Neural Network? What is its activation function? Discuss the merits and demerits of them.	(5)																																								
Ques 4 (b)	<div>For the given Image Feature find the feature Matrix after filtering using weight matrix given below.</div> <div><div><div>Image Matrix</div><table><tr><td>18</td><td>54</td><td>51</td><td>239</td><td>244</td></tr><tr><td>55</td><td>121</td><td>75</td><td>78</td><td>95</td></tr><tr><td>35</td><td>24</td><td>204</td><td>113</td><td>109</td></tr><tr><td>3</td><td>154</td><td>104</td><td>235</td><td>25</td></tr><tr><td>15</td><td>253</td><td>225</td><td>159</td><td>78</td></tr></table></div><div><div>Weight Matrix</div><table><tr><td>1</td><td>0</td><td>1</td></tr><tr><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td></tr></table></div></div>	18	54	51	239	244	55	121	75	78	95	35	24	204	113	109	3	154	104	235	25	15	253	225	159	78	1	0	1	0	1	0	1	0	1	(5)						
18	54	51	239	244																																						
55	121	75	78	95																																						
35	24	204	113	109																																						
3	154	104	235	25																																						
15	253	225	159	78																																						
1	0	1																																								
0	1	0																																								
1	0	1																																								
Ques 5 (a)	<div>Write candidate elimination algorithm. Apply the algorithm to obtain the final version space for the training example.</div> <table><tr><td>Sr. No.</td><td>Sky</td><td>Air Temp</td><td>Humidity</td><td>Wind</td><td>Water</td><td>Forecast</td><td>Enjoy Sport</td></tr><tr><td>1</td><td>Sunny</td><td>Warm</td><td>Normal</td><td>Strong</td><td>Warm</td><td>Same</td><td>Yes</td></tr><tr><td>2</td><td>Sunny</td><td>Warm</td><td>High</td><td>Strong</td><td>Warm</td><td>Same</td><td>Yes</td></tr><tr><td>3</td><td>Rainy</td><td>Cold</td><td>High</td><td>Strong</td><td>Warm</td><td>Change</td><td>No</td></tr><tr><td>4</td><td>Sunny</td><td>Warm</td><td>High</td><td>Strong</td><td>Cold</td><td>Change</td><td>Yes</td></tr></table>	Sr. No.	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport	1	Sunny	Warm	Normal	Strong	Warm	Same	Yes	2	Sunny	Warm	High	Strong	Warm	Same	Yes	3	Rainy	Cold	High	Strong	Warm	Change	No	4	Sunny	Warm	High	Strong	Cold	Change	Yes	(3)
Sr. No.	Sky	Air Temp	Humidity	Wind	Water	Forecast	Enjoy Sport																																			
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes																																			
2	Sunny	Warm	High	Strong	Warm	Same	Yes																																			
3	Rainy	Cold	High	Strong	Warm	Change	No																																			
4	Sunny	Warm	High	Strong	Cold	Change	Yes																																			
Ques 5 (b)	Given the set of values $X = (3, 9, 11, 5, 2)^T$ and $Y = (1, 8, 11, 4, 3)^T$. Evaluate the regression coefficients.	(3)																																								
Ques 5 (c)	What is Fisher Discriminant analysis and how it is different from linear Discriminant analysis?	(4)																																								