

M.Sc.(SC)III/01.22.002 Reg.No.

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COCHIN UNIVERSITY OF SCIENCE AND TECHNOLOGY
M.Sc. COMPUTER SCIENCE WITH SPECIALISATION IN SOFT COMPUTING
THIRD SEMESTER EXAMINATION, JANUARY 2022
18-323- 0301 Machine Learning (Regular)

Time: 3 Hrs.

Maximum Marks: 50

Answer any five questions
 Each section carries 10 Marks

QUESTIONS					Marks																																																							
1	A random sample of 395 people was surveyed and each person was asked to report the highest education level they obtained. The data that resulted from the survey is summarized in the following table:				10																																																							
<table><tr><td></td><td>High School</td><td>Bachelors</td><td>Masters</td><td>Ph.D</td><td>Total</td></tr><tr><td>Female</td><td>60</td><td>54</td><td>46</td><td>41</td><td>201</td></tr><tr><td>Male</td><td>40</td><td>44</td><td>53</td><td>57</td><td>194</td></tr><tr><td>Total</td><td>100</td><td>98</td><td>99</td><td>98</td><td>395</td></tr></table>							High School	Bachelors	Masters	Ph.D	Total	Female	60	54	46	41	201	Male	40	44	53	57	194	Total	100	98	99	98	395																															
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Female	60	54	46	41	201																																																							
Male	40	44	53	57	194																																																							
Total	100	98	99	98	395																																																							
a) Is there any relationship between the gender of an individual and the level of education that they have obtained, based on the above data?																																																												
b) Are gender and education level dependent at 5% level of significance?																																																												
2	Use Naive Bayes algorithm to determine whether a red domestic SUV car is a stolen car or not using the following data:				10																																																							
<table><tr><td>Example No.</td><td>Colour</td><td>Type</td><td>Origin</td><td>Whether Stolen</td></tr><tr><td>1</td><td>Red</td><td>Sports</td><td>Domestic</td><td>Yes</td></tr><tr><td>2</td><td>Red</td><td>Sports</td><td>Domestic</td><td>No</td></tr><tr><td>3</td><td>Red</td><td>Sports</td><td>Domestic</td><td>Yes</td></tr><tr><td>4</td><td>Yellow</td><td>Sports</td><td>Domestic</td><td>No</td></tr><tr><td>5</td><td>Yellow</td><td>Sports</td><td>Imported</td><td>Yes</td></tr><tr><td>6</td><td>Yellow</td><td>SUV</td><td>Imported</td><td>No</td></tr><tr><td>7</td><td>Yellow</td><td>SUV</td><td>Imported</td><td>Yes</td></tr><tr><td>8</td><td>Yellow</td><td>SUV</td><td>Domestic</td><td>No</td></tr><tr><td>9</td><td>Red</td><td>SUV</td><td>Imported</td><td>No</td></tr><tr><td>10</td><td>Red</td><td>Sports</td><td>Imported</td><td>Yes</td></tr></table>						Example No.	Colour	Type	Origin	Whether Stolen	1	Red	Sports	Domestic	Yes	2	Red	Sports	Domestic	No	3	Red	Sports	Domestic	Yes	4	Yellow	Sports	Domestic	No	5	Yellow	Sports	Imported	Yes	6	Yellow	SUV	Imported	No	7	Yellow	SUV	Imported	Yes	8	Yellow	SUV	Domestic	No	9	Red	SUV	Imported	No	10	Red	Sports	Imported	Yes
Example No.	Colour	Type	Origin	Whether Stolen																																																								
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9	Red	SUV	Imported	No																																																								
10	Red	Sports	Imported	Yes																																																								

3	Use CART algorithm to find the root node of the decision tree for the data in the following table	10																																												
<table><tr><th>Age</th><th>Competition</th><th>Type</th><th>Class (Profit)</th></tr><tr><td>Old</td><td>Yes</td><td>Software</td><td>Down</td></tr><tr><td>Old</td><td>No</td><td>Software</td><td>Down</td></tr><tr><td>Old</td><td>No</td><td>Hardware</td><td>Down</td></tr><tr><td>Mid</td><td>Yes</td><td>Software</td><td>Down</td></tr><tr><td>Mid</td><td>Yes</td><td>Hardware</td><td>Down</td></tr><tr><td>Mid</td><td>No</td><td>Hardware</td><td>Up</td></tr><tr><td>Mid</td><td>No</td><td>Software</td><td>Up</td></tr><tr><td>New</td><td>Yes</td><td>Software</td><td>Up</td></tr><tr><td>New</td><td>No</td><td>Hardware</td><td>Up</td></tr><tr><td>New</td><td>No</td><td>Software</td><td>Up</td></tr></table>			Age	Competition	Type	Class (Profit)	Old	Yes	Software	Down	Old	No	Software	Down	Old	No	Hardware	Down	Mid	Yes	Software	Down	Mid	Yes	Hardware	Down	Mid	No	Hardware	Up	Mid	No	Software	Up	New	Yes	Software	Up	New	No	Hardware	Up	New	No	Software	Up
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New	Yes	Software	Up																																											
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4	Find all frequent item sets using Apriori algorithm from the following data, given minimum support is 2 and minimum confidence is 50%. Also list all the possible association rules?	10																																												
<table><tr><th>TID</th><th>List of item IDs</th></tr><tr><td>T100</td><td>11,12,15</td></tr><tr><td>T200</td><td>12,14</td></tr><tr><td>T300</td><td>12,13</td></tr><tr><td>T400</td><td>11,12,14</td></tr><tr><td>T500</td><td>11,13</td></tr><tr><td>T600</td><td>12,13</td></tr><tr><td>T700</td><td>11,13</td></tr><tr><td>T800</td><td>11,12,13,15</td></tr><tr><td>T900</td><td>11,12,13</td></tr></table>			TID	List of item IDs	T100	11,12,15	T200	12,14	T300	12,13	T400	11,12,14	T500	11,13	T600	12,13	T700	11,13	T800	11,12,13,15	T900	11,12,13																								
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5	Applying the k- means clustering algorithm, find two clusters in the following data.	10																																												
<table><tr><td>x</td><td>185</td><td>170</td><td>168</td><td>179</td><td>182</td><td>188</td><td>180</td><td>180</td><td>183</td><td>180</td><td>180</td><td>177</td></tr><tr><td>y</td><td>72</td><td>56</td><td>60</td><td>68</td><td>72</td><td>77</td><td>71</td><td>70</td><td>84</td><td>88</td><td>67</td><td>76</td></tr></table>			x	185	170	168	179	182	188	180	180	183	180	180	177	y	72	56	60	68	72	77	71	70	84	88	67	76																		
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y	72	56	60	68	72	77	71	70	84	88	67	76																																		
6	a) Explain genetic algorithm with a neat flowchart? b) Explain the process of crossing over with the help of an example?	5 5																																												
7	a) Explain convolutional neural networks with a neat architecture? b) Write a short note on LSTM?	5 5																																												