



Daffodil International University

Faculty of Science & Information Technology

Department of Computer Science and Engineering

Mid Semester Examination, Spring-2024

Course Code: CSE321 Course Title: Data Mining and Machine Learning

Level: 3 Term: 2

Exam Duration: 1.5 Hours

Marks: 25

Answer ALL Questions

[The figures in the right margin indicate the full marks and corresponding course outcomes. All portions of each question must be answered sequentially.]

1.	a)	Discuss any two categories of tasks usually performed in Data Mining and Machine Learning with example.	[3]	CO1																																				
	b)	Explain the impact of “Curse of dimensionality” in Data Mining and Machine Learning tasks.	[2]																																					
2.	Consider the following data set of students and their scores in three subjects:			CO2																																				
	<table><tr><td>Name</td><td>Math</td><td>Physics</td><td>Chemistry</td></tr><tr><td>Rahim</td><td>85</td><td>90</td><td>95</td></tr><tr><td>Karim</td><td>75</td><td>80</td><td>85</td></tr><tr><td>Julekha</td><td>65</td><td>70</td><td>75</td></tr><tr><td>Sokhina</td><td>55</td><td>60</td><td>65</td></tr><tr><td>Sakib</td><td>63</td><td>55</td><td>70</td></tr><tr><td>Mysna</td><td>70</td><td>78</td><td>83</td></tr><tr><td>Zorina</td><td>90</td><td>87</td><td>82</td></tr><tr><td>Arman</td><td>63</td><td>58</td><td>52</td></tr></table>		Name		Math	Physics	Chemistry	Rahim	85	90	95	Karim	75	80	85	Julekha	65	70	75	Sokhina	55	60	65	Sakib	63	55	70	Mysna	70	78	83	Zorina	90	87	82	Arman	63	58	52	
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a)	Apply simple linear regression to find the equation of the best-fit line that predicts the Physics score based on the Math score. Show your calculations and the final equation.	[3]																																						
b)	Use the equation of the best-fit line calculated in 2a. to predict the Physics score of a student who scored 70 in Math. Show your calculation and the final answer.	[2]																																						
3.	Consider the following classification task of whether a person is fit or not based on their age and weight.		[5]	CO2																																				
	<table><tr><td>Age</td><td>Weight</td><td>Class</td></tr><tr><td>30</td><td>80</td><td>Fit</td></tr><tr><td>40</td><td>90</td><td>Not fit</td></tr><tr><td>35</td><td>60</td><td>Fit</td></tr><tr><td>45</td><td>70</td><td>Not fit</td></tr><tr><td>38</td><td>73</td><td>Fit</td></tr><tr><td>30</td><td>80</td><td>Fit</td></tr><tr><td>20</td><td>90</td><td>Not fit</td></tr></table>		Age		Weight	Class	30	80	Fit	40	90	Not fit	35	60	Fit	45	70	Not fit	38	73	Fit	30	80	Fit	20	90	Not fit													
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Use any classification algorithm to classify whether a person who is 25 years old and weighs 70 kg is fit or not fit.																																								

4.	Consider the following dataset of transportation information of employees of a company.		CO3																																																				
	<table border="1"> <thead> <tr> <th>Gender</th><th>Travel Cost</th><th>Income Level</th><th>Transportation Mode</th></tr> </thead> <tbody> <tr><td>Male</td><td>Cheap</td><td>Low</td><td>Bus</td></tr> <tr><td>Male</td><td>Cheap</td><td>Medium</td><td>Bus</td></tr> <tr><td>Female</td><td>Cheap</td><td>Medium</td><td>Train</td></tr> <tr><td>Female</td><td>Cheap</td><td>Low</td><td>Bus</td></tr> <tr><td>Male</td><td>Cheap</td><td>Medium</td><td>Bus</td></tr> <tr><td>Male</td><td>Standard</td><td>Medium</td><td>Train</td></tr> <tr><td>Female</td><td>Standard</td><td>Medium</td><td>Train</td></tr> <tr><td>Female</td><td>Expensive</td><td>High</td><td>Car</td></tr> <tr><td>Male</td><td>Expensive</td><td>Medium</td><td>Car</td></tr> <tr><td>Female</td><td>Expensive</td><td>High</td><td>Car</td></tr> <tr><td>Male</td><td>Standard</td><td>Medium</td><td>?</td></tr> <tr><td>Female</td><td>Cheap</td><td>Medium</td><td>?</td></tr> </tbody> </table>	Gender	Travel Cost	Income Level	Transportation Mode	Male	Cheap	Low	Bus	Male	Cheap	Medium	Bus	Female	Cheap	Medium	Train	Female	Cheap	Low	Bus	Male	Cheap	Medium	Bus	Male	Standard	Medium	Train	Female	Standard	Medium	Train	Female	Expensive	High	Car	Male	Expensive	Medium	Car	Female	Expensive	High	Car	Male	Standard	Medium	?	Female	Cheap	Medium	?		
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a)	Build a decision tree model from the given dataset based on entropy. You should only consider the labeled data for building the tree.	[8]																																																					
b)	Predict the class of the unlabeled data in the dataset using the model built in Q4(a).	[2]																																																					

$$E = - \frac{1}{\text{total}}$$

$$\frac{A}{A+B+C}$$