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Daffodil International University

Faculty of Science & Information Technology
Department of Computer Science & Engineering
Final Semester Examination, Fall 2024
Course Code:CSE325 , Course Title: Data Mining & Machine Learning
Level:3 Term:2 Batch: 61

Time: 2:00 Hrs **Marks: 40**

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) **Analyze** the following transaction dataset to derive all frequent itemsets with a minimum support & Confidence threshold of 50%. Justify your approach by evaluating the intermediate steps and explaining the computational challenges encountered. **[Marks:10]** **CO3**

Transaction ID	Items Purchased
T1	Bread, Butter, Milk, Eggs
T2	Bread, Butter, Jam
T3	Milk, Bread, Butter, Eggs
T4	Butter, Milk, Eggs
T5	Bread, Butter, Eggs, Jam
T6	Bread, Milk, Eggs
T7	Bread, Butter, Milk, Jam
T8	Butter, Jam
T9	Bread, Butter, Milk, Eggs
T10	Butter, Milk, Jam

2. a) ***Explain*** the concept of cross-validation and discuss how it contributes to improving a model's generalization ability on new data. **[Marks:3]** **CO2**

b) ***Demonstrate*** the challenges of using regular K-Fold Cross-Validation with a highly imbalanced dataset. Show how Stratified K-Fold Cross-Validation can be applied to resolve these issues effectively. **[Marks:7]**

3. a) **Define** Hierarchical Agglomerative Clustering (HAC) and **identify** any two methods used to measure the distance between clusters in HAC. **[Marks:2]** **CO3**

b) **Construct** a Dendrogram for the dataset below using HAC with single-linkage. Data-points are **A1**(1,3),**A2**(2,4),**A3**(3,5),**A4**(7,8),**A5**(8,9),**B1**(1,2),**B2**(4,6). **[Marks:8]**

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4.	a)	**Analyze** Forward Propagation on the following Neural Network given below and calculate the loss. The actual output of y8=0.01 and y9=0.99 and the neurons are using sigmoid activation function.	**[Marks:10]**	**CO4**

