

PART – B

(5 x 13 = 65 Marks)

Q.No.	Questions	Marks	KL	CO
11. a)	What are the primary research areas in Artificial Intelligence? Discuss how these areas contribute to the development and improvement of AI systems.	13	K2	CO1
	(OR)			
b)	Explain the different types of machine learning with an examples.	13	K2	CO1
12. a)	Demonstrate the process of selecting an appropriate model in Machine Learning. What factors should be considered when choosing a model for a given dataset or problem? Discuss the role of model complexity and overfitting.	13	K2	CO2
	(OR)			
b)	In a healthcare setting, you have collected patient data to predict the likelihood of disease onset. Explain how you would train and interpret a machine-learning model for this task. Explain the importance of model interpretability in medical decision-making and patient care.	13	K2	CO2
13. a)	i. How you would develop a spam email detection system using a Naïve Bayes classifier. What features would you consider in your model?	7	K3	CO3
	ii. How would you evaluate the performance of your spam email detection system? Discuss the metrics you would use and their significance.	6		
	(OR)			
b)	For preparation of the exam, a student knows that one question is to be solved in the exam which is either of types A, B, or C. The probabilities of A, B, or C appearing in the exam are 30%, 20%, and 50% respectively. During the preparation, the student solved 9 of 10 problems of type A, 2 of 10 problems of type B, and 6 of 10 problems of type C.	13	K3	CO3
	i. What is the probability that the student will solve the problem of the exam?			
	ii. Given that the student solved the problem, what is the probability that it was of type A?			
14. a)	Imagine you are analyzing the relationship between the number of hours studied and exam scores. How would you use simple linear regression to predict exam scores based on the number of hours studied? Discuss the assumptions underlying this analysis.	13	K3	CO4

(OR)

- b) Illustrate the effectiveness of regularization techniques such as Ridge and Lasso regression in improving the generalization performance of linear regression models and discuss the trade-offs involved in using regularization. 13 K3 CO4

15. a) Suppose we have the following dataset that has various transactions, and from this dataset, find the frequent item sets and generate the association rules using the Apriori algorithm: 13 K3 CO5

TID	items
T1	I1, I2, I5
T2	I2, I4
T3	I2, I3
T4	I1, I2, I4
T5	I1, I3
T6	I2, I3
T7	I1, I3
T8	I1, I2, I3, I5
T9	I1, I2, I3

Minimum support count is 2
Minimum confidence is 60%

(OR)

- b) i. Explain the concept of clustering as a machine-learning task. Discuss how clustering differs from classification, and provide examples of real-world applications where clustering algorithms can be effectively employed. 7 K2 CO5
- ii. Describe the k-Medoids clustering algorithm in detail, including the process of selecting representative objects and updating cluster assignments. 6

PART – C

(1 x 15 = 15Marks)

- | Q.No. | Questions | Marks | KL | CO |
|--------|---|-------|----|-----|
| 16. a) | Consider you are working for a social media platform aiming to categorize user interests for personalized content recommendation. Compare and contrast hierarchical clustering, density-based clustering, and partitioning methods in the context of this application. Provide a case study detailing the implementation of each clustering technique and analyze the effectiveness of clustering algorithms in improving user engagement and satisfaction. | 15 | K3 | CO5 |

(OR)

- b) The following data set contains factors that determine whether tennis is played or not. Using Naive Bayes classifier, find the play prediction for the day <Sunny, Cool, High, Strong>

15 K3 CO3

DAY	OUTLOOK	TEMP	HUMIDITY	WIND	PLAY
Day 1	Sunny	Hot	High	Weak	NO
Day 2	Sunny	Hot	High	Strong	NO
Day 3	Overcast	Hot	High	Weak	YES
Day 4	Rain	Mild	High	Weak	YES
Day 5	Rain	Cool	Normal	Weak	YES
Day 6	Rain	Cool	Normal	Strong	NO
Day 7	Overcast	Cool	Normal	Strong	YES
Day 8	Sunny	Mild	High	Weak	NO
Day 9	Sunny	Cool	Normal	Weak	YES
Day 10	Rain	Mild	Normal	Weak	YES
Day 11	Sunny	Mild	Normal	Strong	YES
Day 12	Overcast	Mild	High	Strong	YES
Day 13	Overcast	Hot	Normal	Weak	YES
Day 14	Rain	Mild	High	Strong	NO