



B. TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Second Semester

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

U18AII2205: Introduction to AI and ML

COURSE OUTCOMES

CO1: Understand the basic concepts of machine learning and some typical applications

CO2: Understanding how to build and validate models and improve them iteratively

CO3: Understand the core concepts of Artificial Intelligence and Applications

CO4: Apply knowledge representation with artificial intelligence using FOL and Predicate logic

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

- | | | |
|--|------|----------------|
| 1. Differentiate supervised from unsupervised learning with appropriate examples. | CO 1 | K ₂ |
| 2. Elaborate the purpose of gradient descent algorithm? | CO 2 | K ₂ |
| 3. What features of SVM makes it prominent than the other algorithms? | CO 2 | K ₂ |
| 4. Given two objects represented by the tuples (22, 1, 42, 10) and (10, 15, 20, 8): Compute the Euclidean distance between the two objects. | CO 2 | K ₃ |
| 5. Differentiate k-Means Clustering and Hierarchical Clustering. | CO 2 | K ₂ |
| 6. What is Informed or Heuristic Search? | CO 3 | K ₂ |
| 7. Where is the Unification Algorithm used? Justify its application with an Example. | CO 4 | K ₂ |
| 8. Justify the need for knowledge representation in AI? What are the different types of knowledge? | CO 4 | K ₂ |
| 9. Check whether the following formula is valid or not : $(A \rightarrow B) \leftrightarrow (\neg B \rightarrow \neg A)$. | CO4 | K ₃ |
| 10. Given the following statements represented by the variables A, B, and C, Translate the following sentence into propositional logic.
A – Alice is elected secretary. B – Bert is elected governor.
C – Calvin is elected treasurer.
If Alice is elected secretary, then either Bert is elected governor or Calvin is elected treasurer. | CO4 | K ₃ |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

11. a) Explain the K-Nearest Neighbor algorithm with its advantages and disadvantages 8 CO 2 K₂
 b) Use K-Means algorithm to divide the following data into three clusters 8 CO 2 K₃

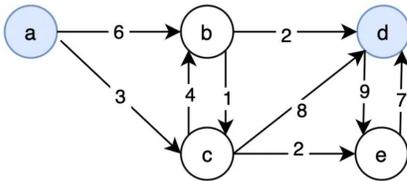
A ₁	A ₂	A ₃	A ₄	A ₅	A ₆	A ₇	A ₈
(2,10)	(2,5)	(8,4)	(5,8)	(7,5)	(6,4)	(1,2)	(4,9)

The initial cluster centers are A₁(2,10), A₄(5,8) and A₇(1,2)

12. a) Is the Decision Tree classification Algorithm accurate in generating optimal results for classification? Explain the Algorithm in detail. 8 CO 2 K₂
 b) Construct the decision tree for the given dataset. 8 CO 2 K₃

Instance	Classification	A1	A2
1	+	T	T
2	+	T	T
3	-	T	F
4	+	F	F
5	-	F	T
6	-	F	T

13. a) A model is developed using one of the best Machine Learning algorithms. Illustrate how to evaluate the accuracy of the classifier or predictor using a Confusion matrix, precision, recall, ROC curve, and AUC score. 16 CO 2 K₂
 14. a) Elaborate on any four uninformed search strategies with your own examples. 16 CO 3 K₂
 15. a) Solve the Water jug problem with the possible state space, initial and goal state, and all the possible production rules. 8 CO 3 K₃
 b) 8 CO 3 K₃



For the above graph, perform Uniform Cost Search and find out the searching cost. The initial node is 'a' and the goal node is 'd'. Evaluate the Time complexity, Space complexity, completeness and optimality of the algorithm.

16. a) Consider the following sentences: 16 CO 4 K₃

John likes all kinds of food.

Apples are food.

Chicken is food

Anything anyone eats and isn't killed by is food.

Bill eats peanuts and is still alive.

Sue eats everything Bill eats.

(i) Translate these sentences into formulas in predicate logic.

(ii) Convert the formulas of a part into clause form

(iii) Prove that John likes peanuts using resolution
