



B.TECH. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Second Semester

ARTIFICIAL INTELLIGENCE AND DATA SCIENCE

U18AII2205: Introduction to AI & 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: -

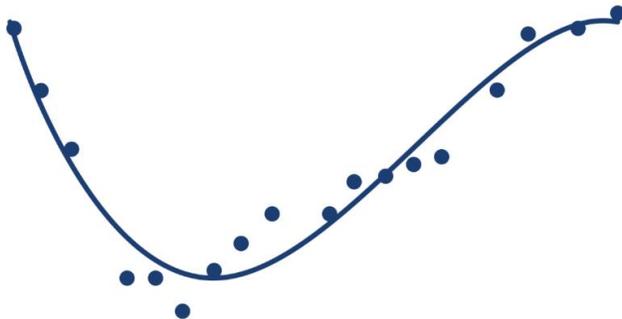
PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

1. Categorize the independent variables in the data given below and what strategy can be adopted to handle the missing values? CO1 [K₂]

Sl.No	IsStudent	Age
1	No	?
2	Yes	20
3	?	35
4	Yes	24

2. Identify the type of regression given below and discuss the pros and cons of the model. CO1 [K₃]



3. Summarize hypothesis testing? CO2 [K₁]
 4. Illustrate the bias variance trade off. CO2 [K₂]
 5. Explain the role of agent in Artificial Intelligence. CO3 [K₂]

6. Apply Breadth First Search traversal on the graph given below and trace the traversal path. CO3 [K₃]
7. List the three solution methods for constraint satisfaction problems. CO3 [K₁]
8. Compare the two main approaches to game playing in AI. CO4 [K₂]
9. Construct any two universal instantiations of $\forall x \text{ king}(x) \wedge \text{greedy}(x) \rightarrow \text{Evil}(x)$. CO4 [K₃]
10. Outline Universal Generalization. CO4 [K₃]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

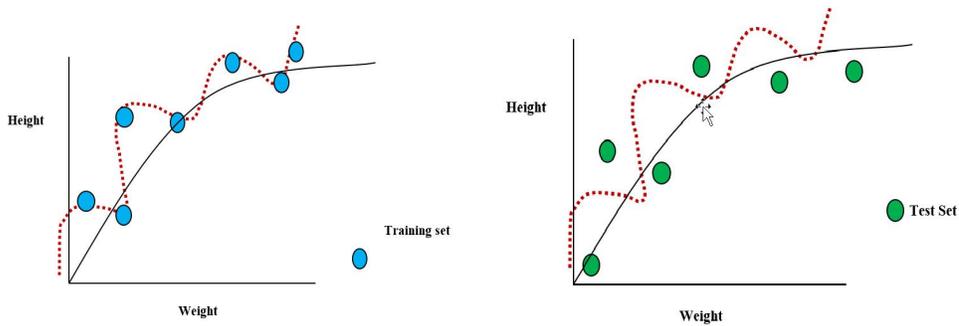
11. a) Construct a linear model for the data given below and predict the glucose level of a subject with age 55. 10 CO1 [K₃]

SUBJECT	AGE X	GLUCOSE LEVEL Y
1	43	99
2	21	65
3	25	79
4	42	75
5	57	87
6	59	81
7	55	?

- b) Implement a python program to fit an appropriate model for the following dataset to classify Y based on predicting “probability value” through a linear combination of the given features (X₁ and X₂) 6 CO1 [K₃]

X1	X2	Y
5	7	Bad
8	6	Bad
2	3	Good
2	5	Good

12. a) Explain how weak learners are made strong. 10 CO1 [K₂]
- b) Summarize how to determine the optimal number of clusters in k-means unsupervised algorithm. 6 CO1 [K₂]
13. a) The spread of training, test datapoints and the model (squiggly line) are given in the plot below. Identify the problem faced by the model from the visualization and explain any three solutions to fix the issue? 16 CO2 [K₃]



14. a) Identify the following performance metrics from the Confusion matrix given below for a Binary Classifier and calculate each. 10 CO2 [K₃]
- Misclassification rate
 - True positive rate
 - False Positive rate
 - True negative rate
 - Accuracy

n=165	Predicted: NO	Predicted: YES
Actual: NO	50	10
Actual: YES	5	100

- b) Interpret AUC - ROC Curve from True Positive Rate and False Positive Rate? 6 CO2 [K₂]
15. a) Develop an algorithm for execution of Simple Hill Climbing. 6 CO3 [K₂]
- b) Implement a travelling salesman problem in python to identify the shortest route. 10 CO3 [K₃]
16. a) Outline the five mainly used logical connectives in propositional logic? Explain with examples. 10 CO4 [K₂]
- b) Explain the syntax of first order logic. 6 CO4 [K₂]
