



**End Term (Odd) Semester Examination November 2025**

Roll no.....

Name of the Course and semester: B. Tech CSE AI&ML and 3<sup>rd</sup> Semester

Name of the Paper: Fundamentals of AI and ML

Paper Code: TCS 364

Time: 3 hour

Maximum Marks: 100

**Note:**

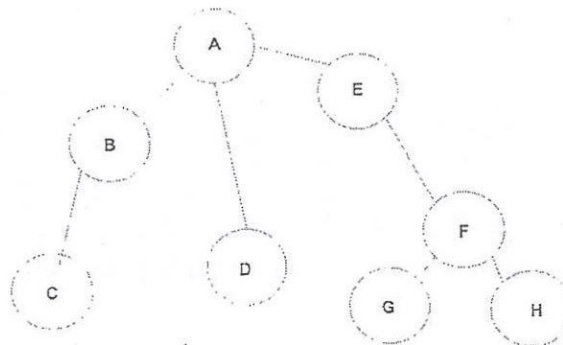
- (i) All the questions are compulsory.
- (ii) Answer any two sub questions from a, b and c in each main question.
- (iii) Total marks for each question is 20 (twenty).
- (iv) Each sub-question carries 10 marks.

Q1.

(2X10=20 Marks)

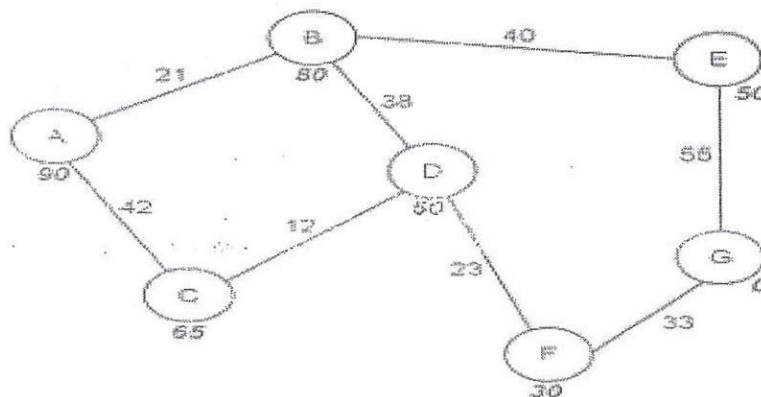
a. Elaborate the term artificial intelligence. Differentiate between machine learning and deep learning. CO1

b. Discuss the Breadth First Search (BFS) algorithm. Apply BFS algorithm on following graph, show all operations to find the goal state 'G':



Find out the time complexity if node 'G' is goal node and node 'A' is start node. CO3

c. State and explain A\* algorithm. Consider the following graph:



Find the most cost-effective path from start state A to final state using A\* algorithm. CO4



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Q2.

(2X10=20 Marks)

a. Translate following sentences in First order predicate logic (FOPL):

- Hari likes all kind of food.
- Bananas and Apples are food.
- Anything anyone eats and isn't killed by food.
- Ajay eats peanuts and still alive.
- Hari eats everything ram eats.

CO6

b. Discuss different type of machine learning. Differentiate between supervised and unsupervised learning.

CO1

c. Consider following dataset:

CO4

Name	Age	Gender	Sport
Ajay	32	M	Football
Mark	40	M	Neither
Sara	16	F	Cricket
Zara	34	F	Cricket
Sachin	55	M	Neither
Rahul	40	M	Cricket
Pooja	20	F	Neither
Smith	15	M	Cricket
Laxmi	55	F	Football
Michael	15	M	Football

Using K-Nearest Neighbor algorithm, Classify sample {Name = Angelina, Age=5, Gender =F}

Q3.

(2X10=20 Marks)

a. Discuss and draw the architecture of intelligent agent. Explain all type of agents in AI with suitable real-life examples.

CO2

b. Given a data set of height and weight of security staff. Classify them into 2 clusters. Take David and Dany as initial centroid. Make use of K-means algorithm.

CO3

Name	Height	Weight
David	185	72
Dany	170	56
Dora	168	60
Ana	179	68
Kate	182	72
Tom	188	77

c. Differentiate between supervised and unsupervised learning with suitable example.

CO1

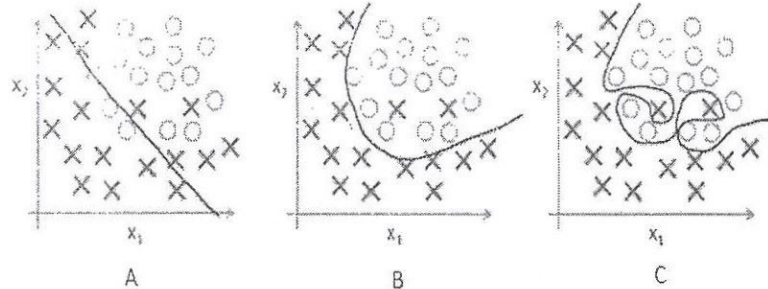


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Q4.

(2X10=20 Marks)

a. Below are the three scatter plot (A,B,C left to right) and hand drawn decision boundaries for logistic regression.



Which of the following above figure shows that the decision boundary is overfitting the training data? What do you conclude after seeing this visualization? Suppose, above decision boundaries were generated for the different value of regularization. Which of the above decision boundary shows the maximum regularization? CO6

b. What do you mean by bias and variance? Explain bias and variance value for underfitting and overfitting problem? What show be value of bias and variance for an optimal model? CO3

c. What do you mean by Apriori algorithm. How this algorithm is useful to make association rule. Explain with suitable example. CO2

Q5.

(2X10=20 Marks)

a. In the table below, the  $x_i$  column shows scores on the aptitude test. Similarly, the  $y_i$  column shows statistics grades. Determine the following:

1. Regression Equation
2. Coefficient of Determination

Student	$x_i$	$y_i$
1	95	85
2	85	95
3	80	70
4	70	65
5	60	70

CO5

b. Explain the concept of Bayes decision theory. How you can make decision rule using this theory. Explain using appropriate example. CO3



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c. Explain following terms:

- a) Random forest algorithm
- b) Imbalance of dataset
- c) Outlier in dataset
- d) Bagging and boosting
- e) Performance measurement of machine learning model.

CC3