


VIT

 Vellore Institute of Technology
(Deemed to be University under section 3 of the UEA, 1956)
Final Assessment Test – April 2025

Course: BMEE407L - Artificial Intelligence

Class NBR(s): 3565 / 3566 / 3567 / 3568

Time: Three Hours

Slot: D2+TD2

Max. Marks: 100

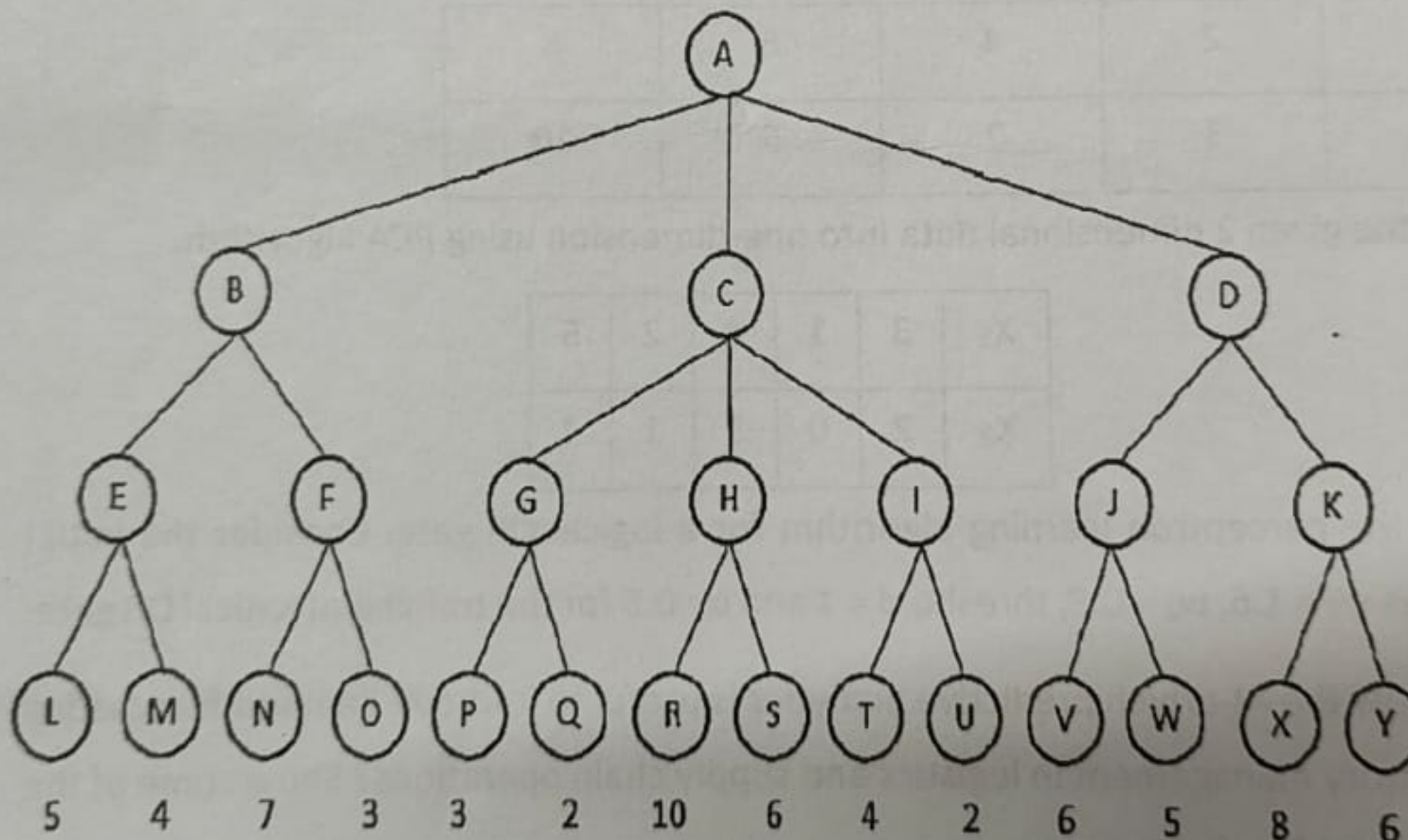
- KEEPING MOBILE PHONE/ANY ELECTRONIC GADGETS, EVEN IN 'OFF' POSITION IS TREATED AS EXAM MALPRACTICE
- DON'T WRITE ANYTHING ON THE QUESTION PAPER

Answer ALL Questions
 (10 X 10 = 100 Marks)

1. Develop PEAS for the following artificial intelligent agents.

- i) Part-picking robot in a manufacturing plant.
- ii) Medical diagnosis system.
- iii) Automated Taxi driver agent.
- iv) Refinery control operator.
- v) Shopping for 'used AI books' on the Internet.

2. Apply the Alpha Beta pruning algorithm in the following tree and show the results of every step, the pruned branches if any and the final optimal path.



3. You are organizing a picnic and need to consider the weather conditions. The following statements are known about the weather and its impact on the picnic:

- If it is raining, then the ground will be wet.
- If the ground is wet, then the picnic will be cancelled.
- If it is sunny, then it cannot be raining.
- It is either raining or sunny.

Apply propositional logic and prove using resolution with contradiction that the picnic will be cancelled.

4. Consider the following dataset which includes demographic information and credit scores of individuals.

Age	Gender	Income	Education	Occupation	Credit Score
<40	Male	High	Graduate	Professional	Low
<40	Female	Medium	High School	Managerial	Low
<40	Male	High	Postgraduate	Professional	High
>40	Female	High	Postgraduate	Professional	High
>40	Male	Low	High School	Skilled	Low
<40	Female	Medium	Graduate	Managerial	Medium
<40	Male	Medium	Graduate	Professional	High
>40	Female	High	Postgraduate	Managerial	High
>40	Male	High	High School	Skilled	Low
<40	Female	Medium	Graduate	Professional	Medium
>40	Male	Medium	High School	Skilled	Medium
>40	Female	Low	Graduate	Skilled	High

Using Naïve Bayes classification, predict the credit score of a new individual based on their following demographic features: Age>40, Gender=Male, Income=Medium, Education=Graduate, Occupation=Skilled.

5. Determine the least square regression line for the data set given in the following Table. Plot the given points and the regression line in the same rectangular system of axes. Estimate the value of y when the x is 24.

X	2	4	6	8
Y	3	7	5	10

6. Reduce the given 2 dimensional data into one-dimension using PCA algorithm.

X_1	3	1	4	2	5
X_2	2	0	3	1	4

7. Perform the perceptron learning algorithm for a logical OR gate. Consider the initial weights as $w_1 = 1.6$, $w_2 = 0.8$, threshold = 1 and $\alpha = 0.6$ for the training of logical OR gate.

8. Discuss how the AI-driven predictive analytics is useful to improve demand forecasting and inventory management in logistics and supply chain operations? Show some of the AI tools useful for the same.

- 9.a) Demonstrate the working of Convolutional Neural Networks (CNNs) in detail. Describe the different learning algorithms used for training CNNs, including backpropagation, optimization techniques, and regularization methods.

OR

9.b) Illustrate the working of Recurrent Neural Networks (RNNs). Discuss the challenges faced in training RNNs and how advanced architectures like LSTMs and GRUs help address these challenges.

10.a) Describe the AI algorithms and tools useful to enhance the accuracy and efficiency of materials characterization techniques.

OR

10.b) Using a flow chart, demonstrate the process of AI-driven predictive maintenance techniques to improve the accuracy and reliability of mechanical system failure prediction?

Ca/D/TV