


VIT[®]

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Final Assessment Test - April 2025

 Course: **BECE309L** - Artificial Intelligence and Machine Learning

 Class NBR(s): **0717**

 Slot: **C1+TC1**

 Time: **Three Hours**

 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.
 - a) What is an agent? With a neat diagram explain the working of an agent in an environment.
 - b) What is an Environment in AI? Explain any five types environments using suitable examples.
2. Explain the Depth First Search, Depth Limited Search (limit=2) and Iterative deepening depth first search algorithms for the Figure 1.

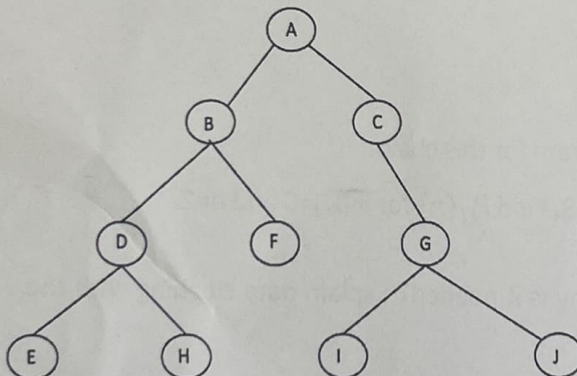


Figure 1

3. Consider the following axioms:
 - a) All hounds howl at night.
 - b) Anyone who has any cats will not have any mice.
 - c) Light sleepers do not have anything which howls at night.
 - d) John has either a cat or a hound.

Solve by Resolution algorithm in First-Order Logic to conclude that "If John is a light sleeper, then John does not have any mice".

4. A Bayesian network is shown in Figure 2, with the corresponding node CPTs (Conditional Probability Table), find out the probability that the patient is sick (S), given that the patient has a fever (F), cough (C), and headache (H). Y-Yes

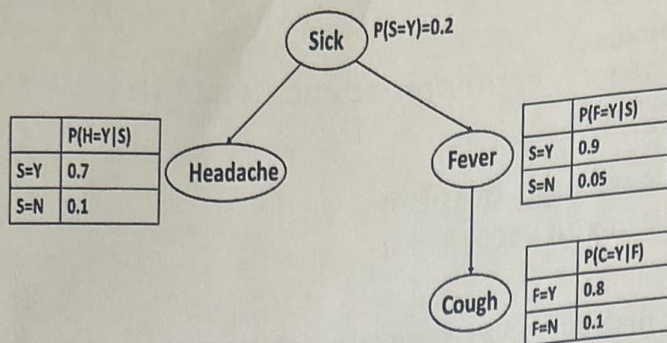


Figure 2

5. Consider the Markov chain with state space $S = \{A, B, C\}$ and transition matrix

$$\begin{bmatrix} \frac{1}{2} & \frac{1}{3} & \frac{1}{6} \\ \frac{1}{4} & 0 & \frac{3}{4} \\ \frac{1}{5} & \frac{1}{10} & \frac{7}{10} \end{bmatrix}$$

- Draw the state transition diagram for this chain.
 - Find $P_{ij}(n)$ for $i=A, j=B$ and $n=3$. Find $P_{ij}(n)$ for $i=B, j=C$ and $n=2$.
6. a) What is data preparation? Why is it needed? Explain data cleaning with the steps.
- b) Normalize the following data using z-score normalization.
Data: {45,50,55,60,65,70,75,80,85,90}
7. Apply k-means algorithm ($k=2$) on the 2-D data shown below for two iterations.
Datapoints: {(1,2), (2,3), (3,3), (6,5), (7,8), (8,6)}.
Initial centroids: C1 (1,2), C2 (6,5)
8. Create a least square regression line for the following data points.
(1, 2), (2, 4), (3, 5), (4, 4), (5, 5)

- 9.(a) Using back propagation network, find the new weights of the net shown in Figure 3. The input values are (0.5, 0.2) and target output is 1. The learning rate is 0.1 and sigmoidal function is used for activation.

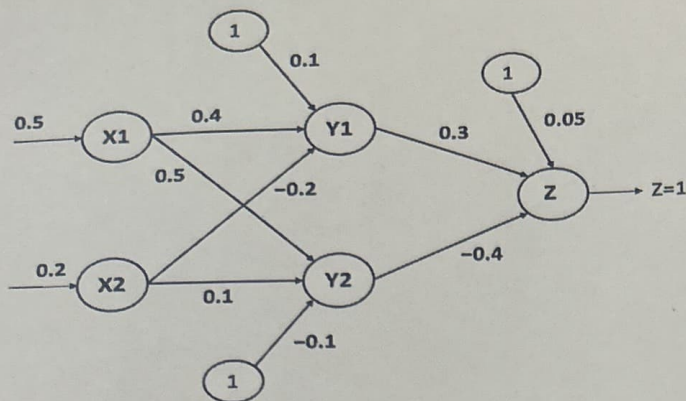


Figure 3

OR

- 9.(b) Apply ID3 to following Table 1 and find the decision tree.

Table 1

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

- 10.(a) Write short notes on, (i) Computational Graphs in Deep Learning and their types and (ii) Kernel machine.

OR

- 10.(b) Explain how CNN (Convolutional Neural Network) work in detail with suitable example.

⇔⇔⇔ Y/D/TY ⇔⇔⇔