

- 8.(b) A company wants to predict whether a customer will buy a new product based on the age and income (in dollars) as shown in Table 5. Apply decision tree to predict a customer having age 33 years and income 42 dollars will buy the product or not.

Table 5

Customer	Age (Years)	Income (Dollar)	Buy Product
1	25	30	No
2	35	70	Yes
3	45	60	Yes
4	20	20	No
5	50	80	Yes
6	23	40	No
7	40	50	Yes
8	30	30	No
9	55	90	Yes

9. Find out the output of a convolution layer with an input image (I) and Kernel (K) as presented in Figure 4 and Figure 5, respectively. Comment on the results.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

Figure 4 Input Image

1	0	-1
1	0	-1
1	0	-1

Figure 5 Kernel

10. Explain Convolutional Neural Network (CNN) and the importance of its different layers. Discuss how the Recurrent Neural Networks (RNN) different from CNN. For time series data analysis, which network will you prefer among these two networks and why? Draw the architecture of the preferred network.

⇔⇔⇔Y/K/TX⇔⇔⇔

- 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. Define and explain the technical terms of Artificial Intelligence given below:

- i) Turing Test
- ii) Percept Sequence
- iii) Simple Reflex agent
- iv) Episodic environment

2.(a) Find the search sequences from node S to G as shown in Figure 1 using:

- i) Depth First Search
- ii) Breadth First Search
- iii) Uniform Cost search if all step costs are 1
- iv) Depth limited Search with limit 3
- v) Iterative Deepening Search

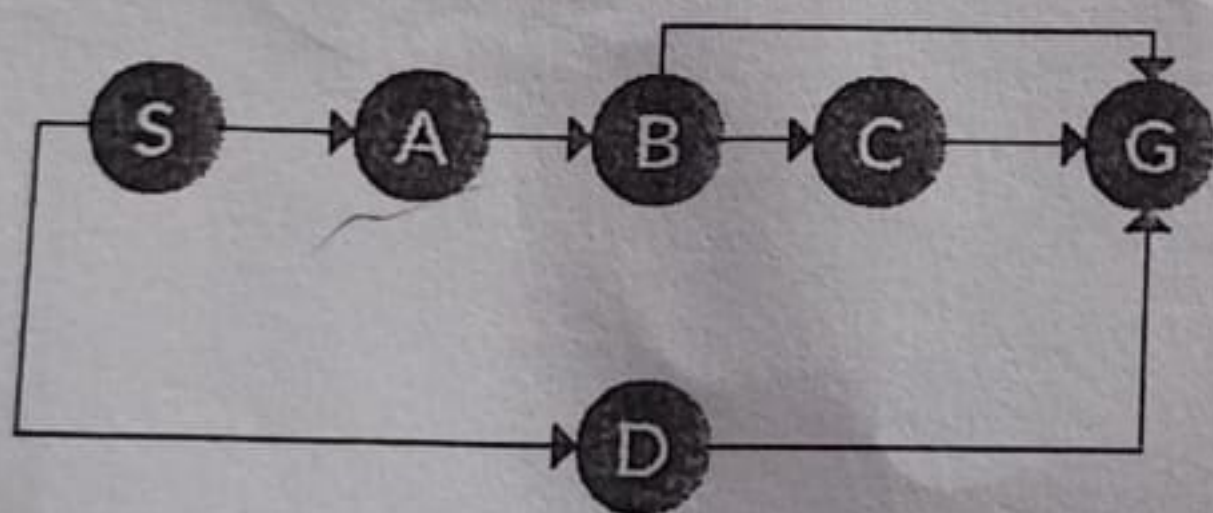
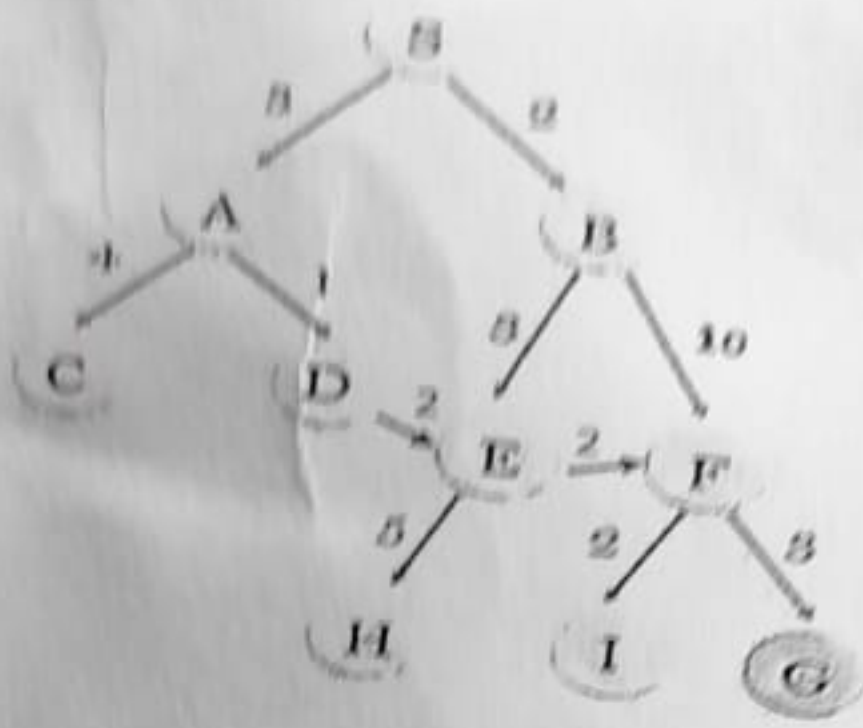


Figure 1

OR

- (b) Calculate the path cost to reach the goal for all the nodes ($h^*(n)$), perform the admissibility test on each node and find how many nodes are not satisfying the admissibility criteria. Find the Greedy Best First Search sequence for the following tree shown in Figure 2, where S is the start node, G is the goal node, and heuristic values of each node are given in the table. The path costs are mentioned on the paths containing two nodes.



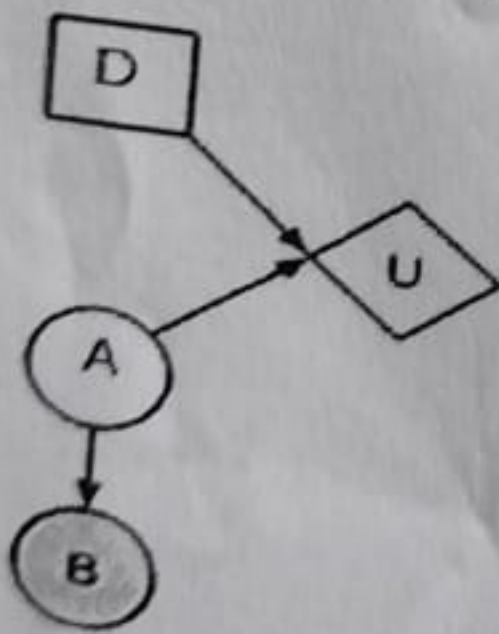
node	H(n)
A	12
B	4
C	7
D	3
E	8
F	2
H	4
I	9
G	13
	0

Figure 2

3. Convert the provided English paragraph into First Order Logic, Convert the statements into conjunctive normal form, then apply resolution to find the conclusion.

"All humans are mortal. Socrates is a human. If someone is mortal, then they will eventually die. Therefore, Socrates will eventually die."

4. A Bayesian decision network is provided as shown in Figure 3, with chance nodes A and B, a utility node U, and a decision node D. The decision is of two types: d or $\bar{d}$. Find out the maximum expected utilities $MEU(b)$, $MEU(\bar{b})$ and value of information, if $P(a)=0.8$, $P(b/a)=0.4$ and $P(b/\bar{a})=0.5$.



U	d	$\bar{d}$
a	30	60
$\bar{a}$	70	20

Figure 3

5. Apply the principal component analysis to reduce the dimension of data from 2 to 1 as shown in Table 1.

Table 1

Feature 1	4	8	13	7
Feature 2	11	4	5	14

6. Find the z-score normalized value (at least up to three decimal values) of the employee's Age, Salary, and Performance evaluation score as shown in Table 2.

Table 2

	Age	Salary	Performance evaluation score
1	35	60000	76
2	37	61500	55
3	41	85000	90
4	25	30000	60
5	45	75000	81

7. Find the least square regression equation for the following set of data as shown in Table 3. Calculate the value of Y when X=10.

Table 3

X	2	4	6	8
Y	3	7	5	10

8.(a) As presented in Table 4, we have 9 candidates who have undergone two rounds of selection process: a presentation round and an interview round. Based on their scores, we want to predict whether they will be selected or rejected for the job. Determine whether the candidate with the Presentation Round Score= 83, and Interview Round Score= 78, is selected or rejected using the KNN algorithm if K=3.

Table 4

Students	Presentation Score	Interview Score	Status
1	85	70	Selected
2	78	75	Selected
3	92	65	Selected
4	60	80	Rejected
5	68	78	Rejected
6	90	85	Selected
7	72	72	Rejected
8	88	90	Selected
9	65	60	Rejected

OR