



Exam :

End Term Quiz

Subject :

AI

Total Marks :

23.00

QP :

2023 Dec24: IIT M FN EXAM FDI2

Exam Mode

Learning Mode

View Question Paper Summary

## QUESTION MENU

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	26	27
28	29	30	31					

## TIMER

00:10



## CONTROLS

SUBMIT EXAM

Your Score

**0.00 / 23.00**

(0%)

Question 1 : 640653701382

Total Mark : 0.00 | Type : MCQ

THIS IS QUESTION PAPER FOR THE SUBJECT "DEGREE LEVEL : AI: SEARCH METHODS FOR PROBLEM SOLVING (COMPUTER BASED EXAM)" ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT? CROSS CHECK YOUR HALL TICKET TO


CONFIRM THE SUBJECTS TO BE WRITTEN. (IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

OPTIONS :

☐ YES

☐ NO

Your score : 0

 Discussions (0)



**Question 2 : 640653701383**

Total Mark : 0.00 | Type : MCQ

Printed graph sheets (hard copy) will be provided for registered candidates only.



OPTIONS :

☐ Printed graph sheets were provided to me.

☐ Printed graph sheets were not provided to me.

☐ I did not use graph sheets.

Your score : 0

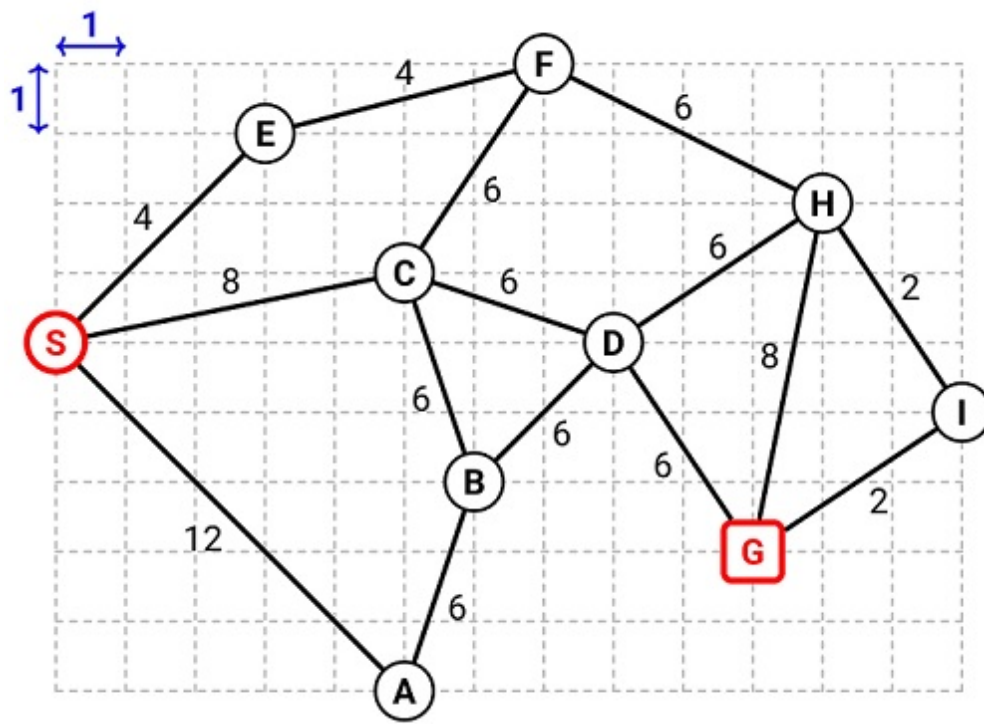
 Discussions (0)



**Question 3 : 640653701384**

Total Mark : 0.00 | Type : COMPREHENSION

SEARCH The figure shows a map on a uniform grid where each tile is 1x1 in size. The start node is S and the goal node is G. The MoveGen function returns nodes in alphabetical order. Use Manhattan Distance as the heuristic function. Tie-breaker: If several nodes have the same cost, use node labels to break the tie. Based on the above data, answer the given subquestions.



Your score : 0



Question 4 :  
640653701385

View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the path found by the Best First Search algorithm? Enter the path as a comma separated list of node labels. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: S,X,Y,Z

Answer (Alphanumeric):

Answer

Accepted Answer : S,A,B,D,G

Your score : 0

 Discussions (0)



**Question 5 :**  
**640653701386**



View Parent QN



View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the path found by A\* search algorithm? Enter the path as a comma separated list of node labels. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: S,X,Y,Z

Answer (Alphanumeric):

Answer

Accepted Answer : S,C,D,G

Your score : 0

 Discussions (0)



**Question 6 :**  
**640653701387**



View Parent QN



View Solutions (0)

Total Mark : 1.00 | Type : SA

What is the path found by Branch-and-Bound search algorithm? Enter the path as a comma separated list of node labels. Use the Branch-and-Bound variation that avoids cyclic expansions like S,A,S,A,S,A,... NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: S,X,Y,Z

Answer (Alphanumeric):


Answer

Accepted Answer : S,E,F,H,I,G

Your score : 0

 Discussions (0)



**Question 7 :**  
**640653701388** View Parent QN View Solutions (0)


Total Mark : 1.00 | Type : MCQ

For the given map, which algorithm finds the shortest path from S to G?

OPTIONS :

- ☐ A\* Search Algorithm
- ☐ Branch-and-Bound Search Algorithm
- ☐ None of these

Your score : 0

 Discussions (0)**Question 8 :**  
**640653701389** View Parent QN View Solutions (0)

Total Mark : 1.00 | Type : MCQ

What can you say about the heuristic function for the given graph?

OPTIONS :

- ☐ Admissible
- ☐ Inadmissible
- ☐ Partly admissible and partly inadmissible
- ☐ Cannot be determined

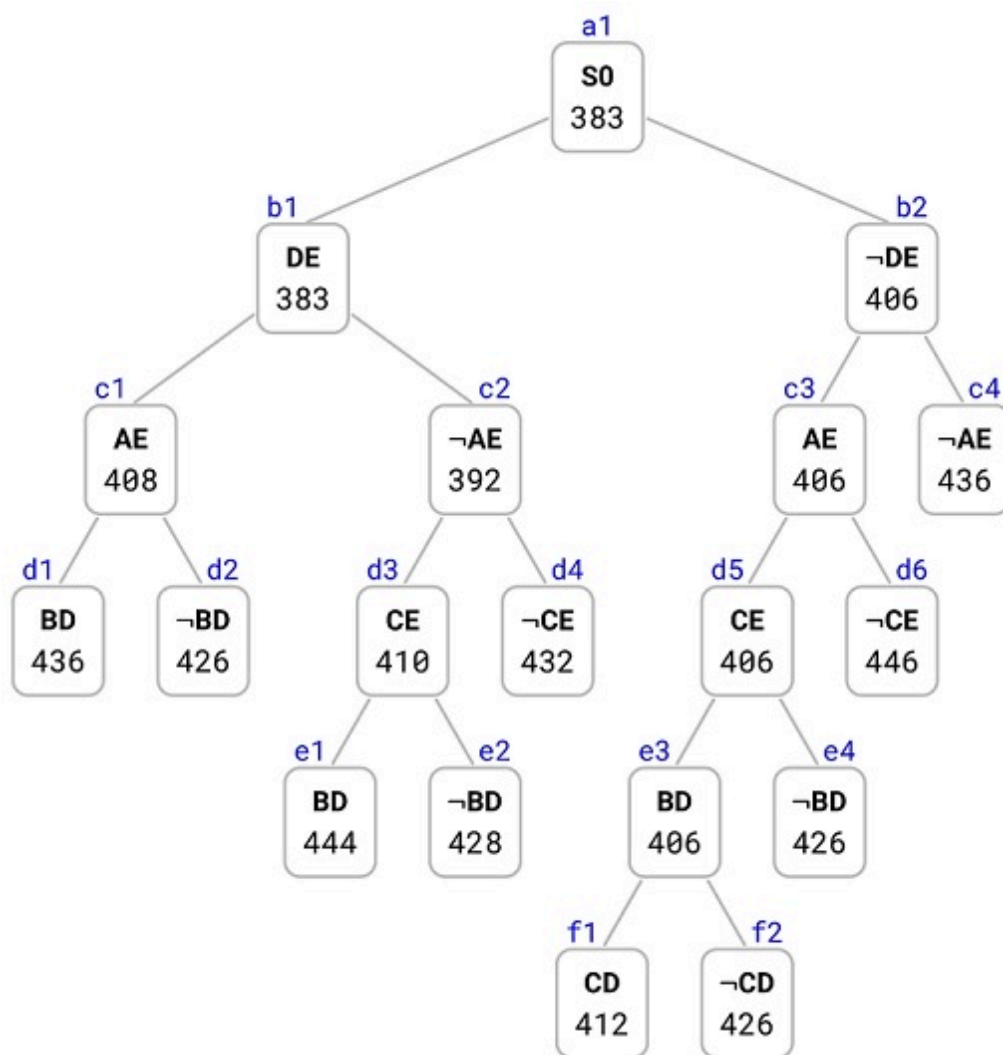
Your score : 0

 Discussions (0)**Question 9 : 640653701390**

Total Mark : 0.00 | Type : COMPREHENSION

TSP Branch-and-Bound The TSP Branch-and-Bound algorithm is solving a TSP instance where the cities are A, B, C, .... and so on. The Branch-and-Bound search tree

at the time when the algorithm has discovered the optimal tour is shown below. Each node in the search tree displays an edge (either  $XY$  or  $\sim XY$ ), a cost value, and a unique reference number (a1, b1, b2, ..., c1, ..., d1, ..., e1, ..., f1, f2). Use the reference numbers to break ties. When required, enter the reference numbers in short answers. What information can you glean from the search tree? Answer the sub-questions based on the information gleaned from the search tree.



Your score : 0



Question 10 :  
640653701391



View Parent QN



View Solutions (0)

Total Mark : 1.00 | Type : SA

Let S0 (ref. no. a1) be the first node to be refined, identify the next 4 nodes (2nd to 5th node) that are refined by the TSP Branch-and-Bound algorithm. Enter the nodes

(node reference numbers) in the order they are refined. Enter a comma separated list of node reference numbers. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: a9,b9,c9,d9

Answer (Alphanumeric):

Accepted Answer : b1,c2,b2,c3

Your score : 0

 Discussions (0)



**Question 11 :**  
**640653701392**



View Parent QN



View Solutions (0)

Total Mark : 1.00 | Type : SA

Which node represents the optimal tour and what is the cost of the optimal tour? Enter the node reference number and the tour cost in the text box, or enter NIL if it is not possible to determine the optimal tour. Enter a node reference number followed by tour cost, separated by comma. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: a9,42

Answer (Alphanumeric):

Accepted Answer : f1,412

Your score : 0

 Discussions (0)



**Question 12 :**  
**640653701393**



View Parent QN



View Solutions (0)


Total Mark : 1.00 | Type : SA

Determine the number of cities in the TSP instance. Enter the number of cities in the text box, or enter NIL if it is not possible to determine the number of cities. Enter an integer. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: 42

Answer (Numeric):

Accepted Answer : 5

Your score : 0

 Discussions (0)**Question 13 :**  
**640653701394**

View Parent QN



View Solutions (0)


Total Mark : 1.00 | Type : SA

Start from city A, what is the path representation of the optimal tour? Enter the path representation in the text box, or enter NIL if it is not possible to determine the optimal tour. Enter a comma separated list of cities (city labels). NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: A,B,C

Answer (Alphanumeric):

Accepted Answer : A,B,D,C,E

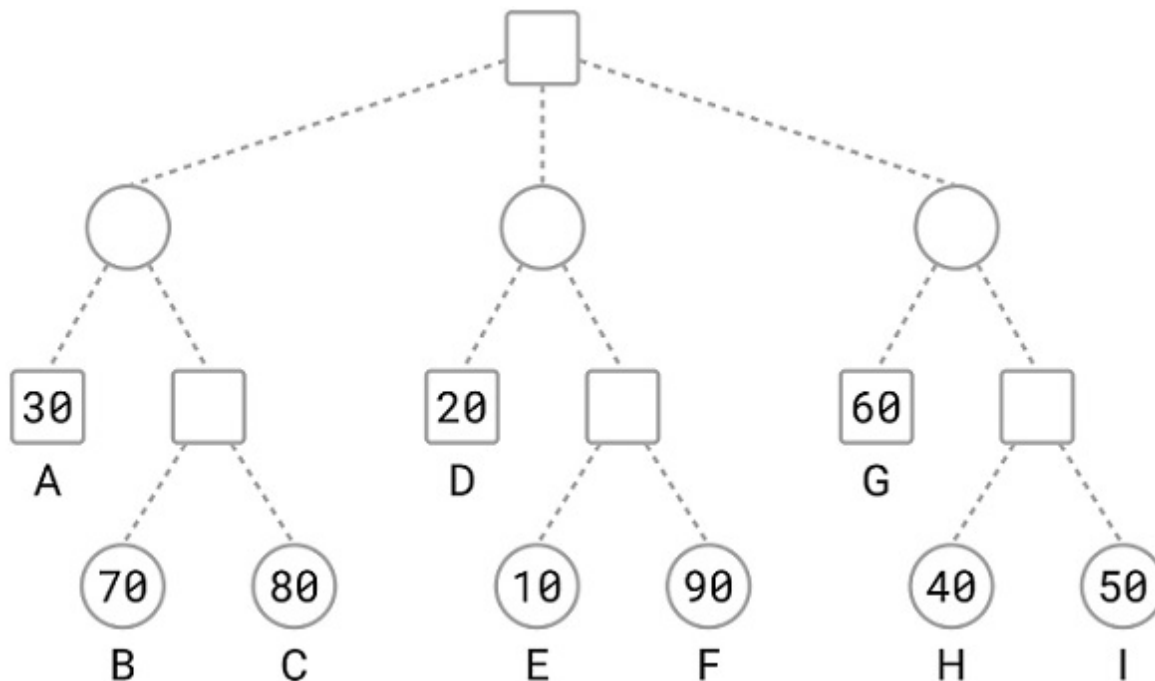
Your score : 0

 Discussions (0)**Question 14 : 640653701395**

Total Mark : 0.00 | Type : COMPREHENSION

GAMES The figure shows a game tree with evaluation function values at the horizon nodes. The horizon nodes are labeled from A to I. Use these labels to enter a horizon node or a list of horizon nodes in short answers (textbox). Tie-breaker: when several nodes carry the same best cost then select the deepest node, if tie persists then select the leftmost of the deepest nodes to break the tie. Based on the above data, answer the given subquestions.





Your score : 0



**Question 15 :**  
**640653701396**



[View Parent QN](#)



[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : MCQ

Which of the following is a strategy for the MAX player?

OPTIONS :

☐ A,D,G

☐ D,E

☐ E,F

☐ G,H,I

Your score : 0



[Discussions \(0\)](#)



**Question 16 :**  
**640653701397**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

List the horizon nodes in the best strategy for MAX. Enter the node labels in alphabetical order. Enter a comma separated list of node labels in alphabetical order. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: X,Y,Z

Answer (Alphanumeric):

Accepted Answer : G,I

Your score : 0

[Discussions \(0\)](#)**Question 17 :**  
**640653701398**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

List the horizon nodes pruned by Alpha-Beta. Enter a comma separated list of node labels in alphabetical order. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: X,Y,Z

Answer (Alphanumeric):

Accepted Answer : C,E,F

Your score : 0

[Discussions \(0\)](#)**Question 18 :**  
**640653701399**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

List the horizon nodes not processed (neither LIVE nor SOLVED) by SSS\*. Enter a comma separated list of node labels in alphabetical order. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: X,Y,Z

Answer (Alphanumeric):

Answer

Accepted Answer : B,C,E,F

Your score : 0

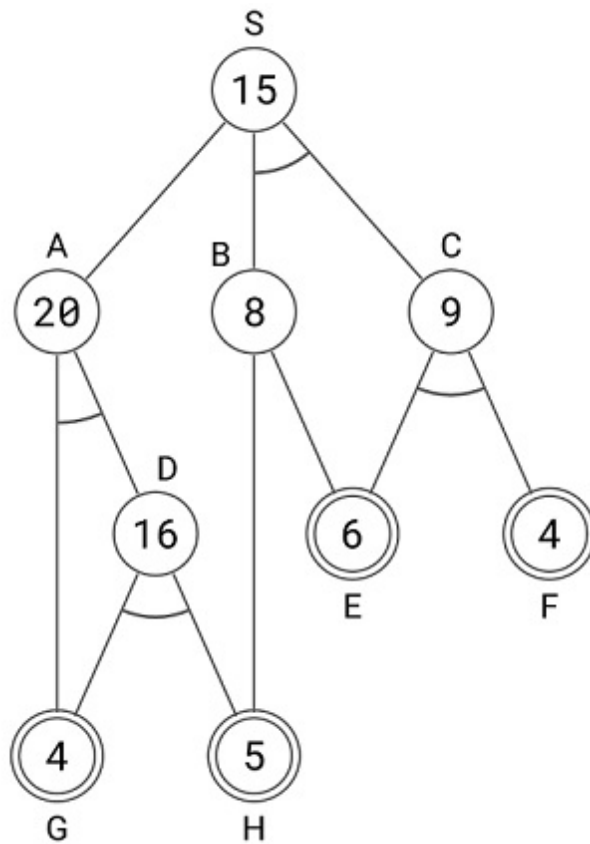
 Discussions (0)



### Question 19 : 640653701400

Total Mark : 0.00 | Type : COMPREHENSION

**PROBLEM DECOMPOSITION** The figure shows an AND-OR graph that depicts how a problem  $S$  can be decomposed into one or more smaller problems. Nodes are uniquely identified by labels ( $S$ ,  $A$ ,  $B$ , ...). The number in each node is the heuristic estimate of the cost of solving that node. Nodes shown in double lines are primitive nodes and their values are actual costs. Observe that a primitive node is added to the graph by its parent when the parent is expanded, and the primitive node is labeled as SOLVED and it will not be expanded subsequently. The cost of each edge is 1 unit. Tie-breaker 1: If several nodes have the same cost then break the tie using node labels. Tie-breaker 2: For AND nodes, select the unsolved branch with the highest cost. Use AO\* algorithm to solve  $S$ , then answer the given subquestions.



Your score : 0



**Question 20 :**  
**640653701401**

[View Parent QN](#)

[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

List the first three nodes (including S) expanded by AO\* algorithm. List the nodes in the order they are expanded. Observe that primitive nodes are not expanded. Enter a comma separated list of node labels. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: X,Y,Z

Answer (Alphanumeric):

Answer

Accepted Answer : S,C,A

Your score : 0

[Discussions \(0\)](#)**Question 21 :**  
**640653701402**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

Determine the value of the start node S after each node is expanded. What are the values of S after the 1st, 2nd and 3rd nodes are expanded, respectively? Enter the 3 values in the textbox. Enter a comma separated list of numbers. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: 12,42,17

Answer (Alphanumeric):

Accepted Answer : 19,21,22

Your score : 0

[Discussions \(0\)](#)**Question 22 :**  
**640653701403**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

What is the final value of the start node S? Enter a number. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEIOUS CHARACTERS. Answer format: 42

Answer (Numeric):

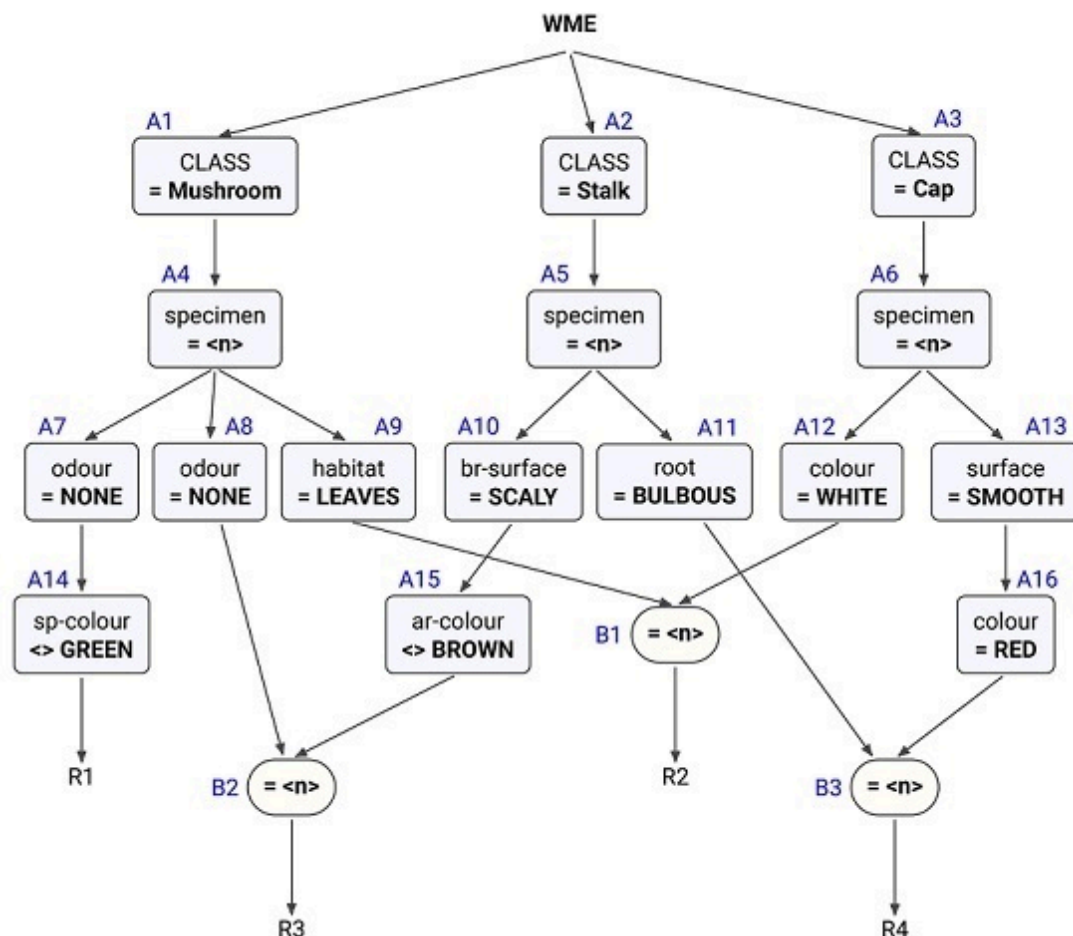
Accepted Answer : 20

Your score : 0

[Discussions \(0\)](#)**Question 23 : 640653701404**

Total Mark : 0.00 | Type : COMPREHENSION

RULE BASED EXPERT SYSTEMS A part of the Rete Net that classifies mushrooms (as edible or poisonous) is shown in the figure. The labels A1, A2, ..., A10, A16, ..., B1, B2, B3, R1, ..., R4 uniquely identify the nodes in the network. When required, use the above label ordering to break ties and to enter short answers. Run the Rete algorithm for the Working Memory shown below, the WMEs are in timestamp order. Assume that WMEs reside at appropriate Alpha nodes, and the Beta nodes point to WMEs residing in Alpha nodes.



RULE BASED EXPERT SYSTEMS A part of the Rete Net that classifies mushrooms (as edible or poisonous) is shown in the figure. The labels A1, A2, ..., A10, A16, ..., B1, B2, B3, R1, ..., R4 uniquely identify the nodes in the network. When required, use the above label ordering to break ties and to enter short answers. Run the Rete algorithm for the Working Memory shown below, the WMEs are in timestamp order. Assume that WMEs reside at appropriate Alpha nodes, and the Beta nodes point to WMEs residing in Alpha nodes. For each WME identify its location (node label) in the Rete Net, and prepare the conflict set for the first cycle, then answer the given subquestions.



101. (Cap ^specimen C36 ^colour RED ^surface SMOOTH)
102. (Cap ^specimen A25 ^colour WHITE ^surface SMOOTH)
103. (Mushroom ^specimen X16 ^odour NONE ^habitat LEAVES)
104. (Mushroom ^specimen A25 ^odour NONE ^habitat LEAVES)
105. (Stalk ^specimen C36 ^root BULBOUS ^ar-colour WHITE)
106. (Stalk ^specimen X16 ^br-surface SCALY ^ar-colour WHITE)
107. (Mushroom ^specimen C36 ^odour NONE ^sp-colour WHITE)
108. (Mushroom ^specimen B49 ^odour ALMOND ^sp-colour BROWN)
109. (Stalk ^specimen B49 ^br-surface SMOOTH)

Your score : 0



**Question 24 :**  
**640653701405**



[View Parent QN](#)



[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : MSQ

Which of the following rule-data tuples are in the conflict-set?

OPTIONS :

- ☐ R1,107
- ☐ R2,102,104
- ☐ R3,103,106
- ☐ R4,101,105
- ☐ R2,102,103
- ☐ R3,104,106

Your score : 0

[Discussions \(0\)](#)



**Question 25 :**  
**640653701406**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : MSQ

If the Inference Engine uses Specificity as the conflict resolution strategy then which of the following rule-data tuples will qualify?

OPTIONS :

- ☐ R1,107
- ☐ R2,102,104
- ☐ R3,103,106
- ☐ R4,101,105
- ☐ R2,102,103
- ☐ R3,104,106

Your score : 0

[Discussions \(0\)](#)**Question 26 :**  
**640653701407**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : MCQ

If the Inference Engine uses Recency as the conflict resolution strategy then which of the following rule-data tuples will qualify?.

OPTIONS :

- ☐ R1,107
- ☐ R2,102,104
- ☐ R3,103,106
- ☐ R4,101,105
- ☐ R2,102,103
- ☐ R3,104,106



Your score : 0

 Discussions (0)



**Question 27 : 640653701408**

Total Mark : 0.00 | Type : COMPREHENSION

**AUTOMATED PLANNING** The domain description of a Blocks World with a single one-armed robot is given below. Consider the planning problem with the following start state and goal description.



## PREDICATES

<code>armEmpty</code>	The arm is not holding any block, it is empty.
<code>holding(X)</code>	The arm is holding X.
<code>onTable(X)</code>	X is on the table.
<code>clear(X)</code>	X has nothing above it, it is clear.
<code>on(X,Y)</code>	X is directly placed on Y.

## OPERATORS

`Pickup(X)`: pick up X from the table.

Preconditions: { `armEmpty`, `clear(X)`, `onTable(X)` }

Add Effects : { `holding(X)` }

Del Effects : { `armEmpty`, `onTable(X)` }

`Putdown(X)`: place X on the table.

Preconditions: { `holding(X)` }

Add Effects : { `armEmpty`, `onTable(X)` }

Del Effects : { `holding(X)` }

`Unstack(X,Y)`: pick up X that is directly sitting on Y.

Preconditions: { `armEmpty`, `clear(X)`, `on(X,Y)` }

Add Effects : { `clear(Y)`, `holding(X)` }

Del Effects : { `armempty`, `on(X,Y)` }

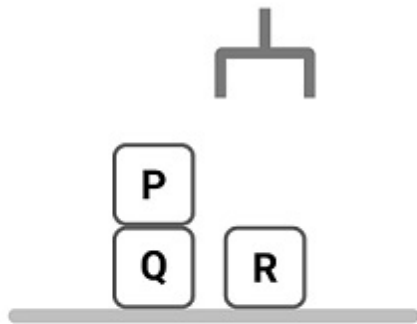
`Stack(X,Y)`: place X directly on top of Y.

Preconditions: { `holding(X)`, `clear(Y)` }

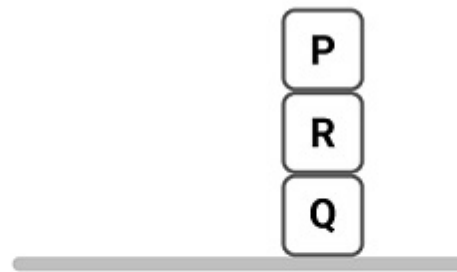
Add Effects : { `armEmpty`, `on(X,Y)` }

Del Effects : { `holding(X)`, `clear(Y)` }

**AUTOMATED PLANNING** The domain description of a Blocks World with a single one-armed robot is given below. Consider the planning problem with the following start state and goal description. Based on the above data, answer the given subquestions.

**Start State**

{ armEmpty, on(P,Q),  
clear(P), clear(R),  
onTable(Q), onTable(R) }

**Goal Description**


{ on(P,R), on(R,Q),  
onTable(Q) }

Your score : 0



**Question 28 :**  
**640653701409**

 [View Parent QN](#)

 [View Solutions \(0\)](#)

Total Mark : 1.00 | Type : MSQ

Which of the following are applicable actions in the start state?


OPTIONS :

- ☐ Pickup (R)
- ☐ Unstack (P,Q)
- ☐ Stack (R,Q)
- ☐ Stack (P,R)
- ☐ Putdown (Q)

Your score : 0

 [Discussions \(0\)](#)



**Question 29 :**  
**640653701410** View Parent QN View Solutions (0)



Total Mark : 1.00 | Type : MSQ

Which of the following are relevant actions in the goal state?

OPTIONS :

- ☐ Pickup (R)
- ☐ Unstack (P,Q)
- ☐ Stack (R,Q)
- ☐ Stack (P,R)
- ☐ Putdown (Q)

Your score : 0

 Discussions (0)**Question 30 :**  
**640653701411** View Parent QN View Solutions (0)

Total Mark : 1.00 | Type : MSQ

In the planning graph, which of the following are mutex action pairs in Layer 1?

OPTIONS :

- ☐ Unstack (P,Q), Pickup (R)
- ☐ Unstack (P,Q), NOP-ACTION for armEmpty
- ☐ Pickup (R), NOP-ACTION for onTable (R)
- ☐ Stack (P,R), Stack (R,Q)
- ☐ Stack (P,R), Putdown (Q)

Your score : 0

 Discussions (0)

**Question 31 :**  
**640653701412**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : MSQ

In the planning graph, which of the following are mutex proposition pairs in Layer 1?

OPTIONS :

- ☐ clear (Q), armEmpty
- ☐ holding (P), holding (R)
- ☐ onTable (R), clear (R)
- ☐ onTable (R), onTable (Q)

Your score : 0

[Discussions \(0\)](#)[✓ SUBMIT EXAM](#)