



Exam : End Term Quiz
Subject : AI
Total Marks : 25.00
QP : 2025 Apr13: IIT M FN EXAM QIM2

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 32 33 34

TIMER

00:19

CONTROLS

SUBMIT EXAM

Your Score
0.00 / 25.00
(0%)

Question 1 : 6406531250046

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 : 6406531250047

Total Mark : 0.00 | Type : MSQ



NOTE: Each exam center must provide graph-sheets (one booklet) for each student registered to take the exam for this course. And additional blank sheets may be provided based on the student's need.



OPTIONS :

Printed graph sheets were provided on time.

Printed graph sheets were provided late.

Printed graph sheets were not provided.

I used the graph sheets.

I did not use graph sheets.

Your score : 0

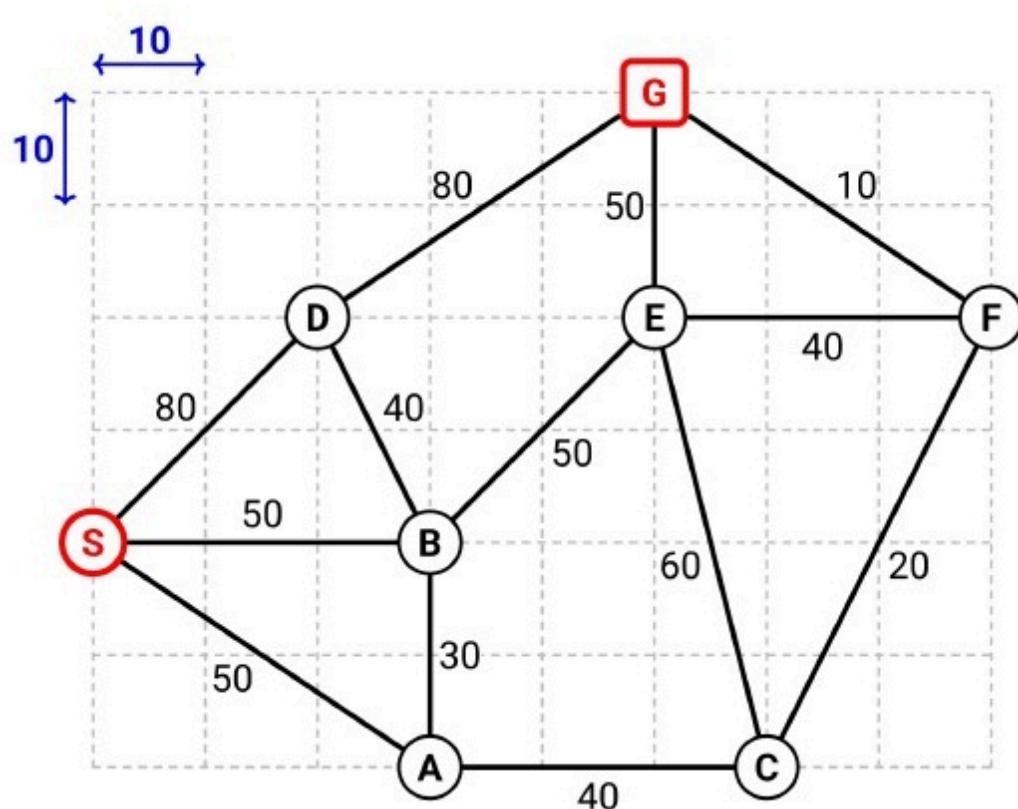
[Discussions \(0\)](#)**Question 3 : 6406531250048**

Total Mark : 0.00 | Type : COMPREHENSION

SEARCH

The figure shows a map on a uniform grid where each tile is 10x10 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 :****6406531250049**[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 EXTRANEous CHARACTERS. **Answer format: S,X,Y,Z**

Answer (Alphanumeric):

Answer

Accepted Answer : S,D,G

Your score : 0

 Discussions (0)



Question 5 :

6406531250050

 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 EXTRANEous CHARACTERS. **Answer format: S,X,Y,Z**

Answer (Alphanumeric):

Answer

Accepted Answer : S,B,E,G

Your score : 0

 Discussions (0)



Question 6 :

6406531250051

 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 EXTRANEous CHARACTERS. **Answer format: S,X,Y,Z**

Answer (Alphanumeric):**Accepted Answer : S,A,C,F,G****Your score : 0**

Discussions (0)

**Question 7 :****6406531250052**

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 :****6406531250053**

View Parent QN



View Solutions (0)

Total Mark : 1.00 | Type : MCQ

Select the correct statement about the given graph.

OPTIONS :

- Heuristic is admissible.
- Heuristic is not admissible.
- Heuristic is admissible in some cases and not admissible in other cases.
- There is not enough information to determine admissibility.

Your score : 0

[Discussions \(0\)](#)**Question 9 : 6406531250054**

Total Mark : 0.00 | Type : COMPREHENSION

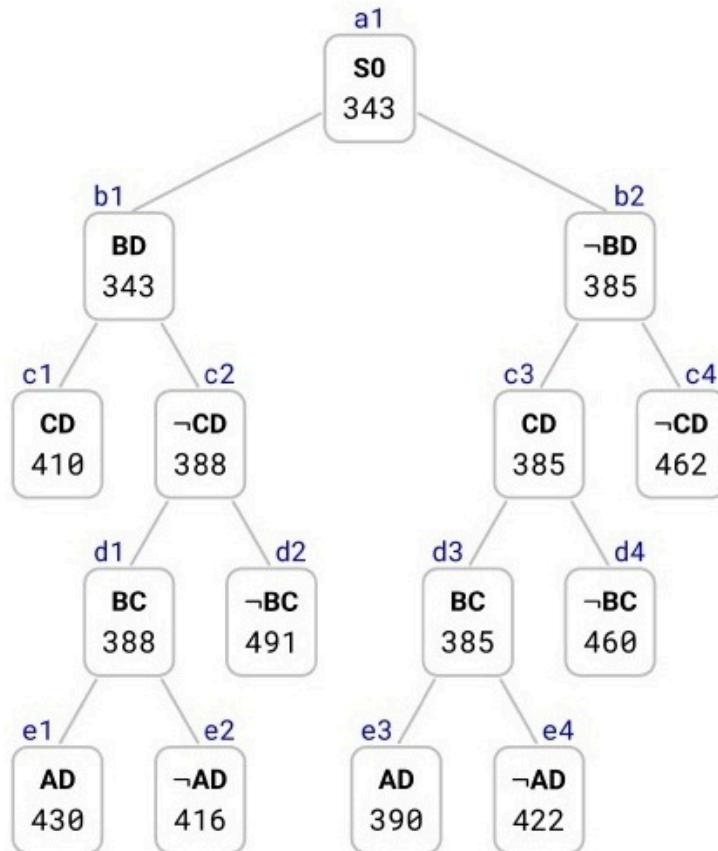
TSP Branch-and-Bound

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 \neg XY), a cost value, and a unique reference number (a1, b1, b2, ..., c1, ..., d1, ..., e1, ..., e4). 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 :****6406531250055**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

In the given search problem, how many nodes were refined in order to discover the optimal tour?

Enter a number. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS. **Answer format: 42**

Answer (Numeric):

Accepted Answer : ["7", "8"]

Your score : 0

[Discussions \(0\)](#)**Question 11 :****6406531250056**[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 EXTRANEous CHARACTERS. **Answer format: a9,42**

Answer (Alphanumeric):

Accepted Answer : e3,390

Your score : 0

[Discussions \(0\)](#)**Question 12 :****6406531250057**[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 EXTRANEous CHARACTERS. **Answer format: 42**

Answer (Numeric):**Accepted Answer : 5****Your score : 0**[Discussions \(0\)](#)**Question 13 :****6406531250058**[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 EXTRANEous CHARACTERS. **Answer format: A,B,C**

Answer (Alphanumeric):**Accepted Answer : A,D,C,B,E****Your score : 0**[Discussions \(0\)](#)

Question 14 : 6406531250059

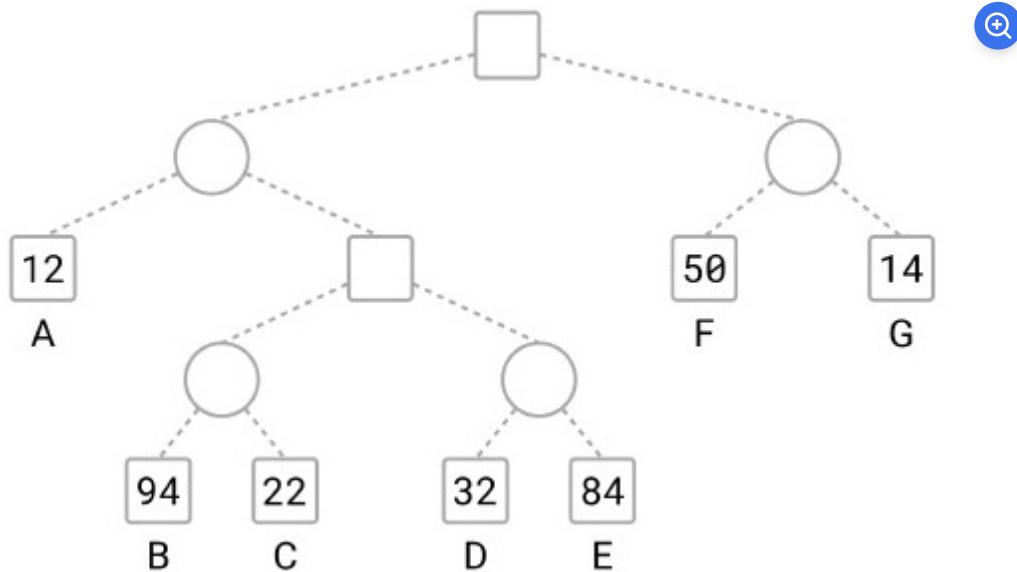
Total Mark : 0.00 | Type : COMPREHENSION

GAMES

The figure shows a game tree with evaluation function values at the horizon nodes. The horizon nodes are labeled from A to G. 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 :**6406531250060**
[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,F
- A,B,D,F
- A,D,E

B,D,F

Your score : 0

[Discussions \(0\)](#)**Question 16 :****6406531250061**[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 EXTRANEous CHARACTERS. **Answer format: X,Y,Z**

Answer (Alphanumeric):

Answer

Accepted Answer : F,G

Your score : 0

[Discussions \(0\)](#)**Question 17 :****6406531250062**[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 EXTRANEous CHARACTERS. **Answer format: X,Y,Z**

Answer (Alphanumeric):

Answer

Accepted Answer : D,E

Your score : 0

[Discussions \(0\)](#)**Question 18 :****6406531250063**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

List the horizon nodes SOLVED by SSS*.

Enter a comma separated list of node labels in alphabetical order. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS. **Answer format: X,Y,Z**

Answer (Alphanumeric):

Answer

Accepted Answer : A,F,G

Your score : 0

[Discussions \(0\)](#)**Question 19 : 6406531250064**

Total Mark : 0.00 | Type : COMPREHENSION

PROBLEM DECOMPOSITION

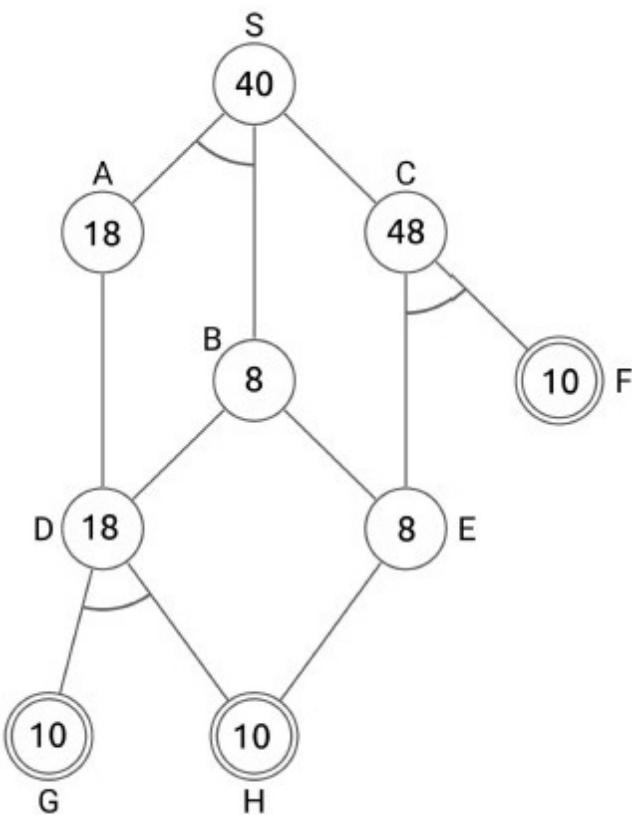
The figure shows an AND-OR graph that depicts how a problem S can be decomposed into one or more smaller problems. Nodes are uniquely identified by labels (S, A, B, ...). The number in each node is the heuristic estimate of the cost of solving that node.

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 2 units.

Tie-breaker 1: If several nodes have the same cost then break the tie using node labels. **Tie-breaker 2:** For AND nodes, expand the unsolved branch with the highest cost.

Use AO* algorithm to solve S, then answer the given subquestions.



Your score : 0



Question 20 :

6406531250065

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 EXTRANEOUS CHARACTERS. **Answer format: X,Y,Z**

Answer (Alphanumeric):

Answer

Accepted Answer : S,A,D

Your score : 0

[Discussions \(0\)](#)**Question 21 :****6406531250066**[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 EXTRANEOUS CHARACTERS. **Answer format: 12,42,17**

Answer (Alphanumeric):**Accepted Answer : 30,32,38****Your score : 0**[Discussions \(0\)](#)**Question 22 :****6406531250067**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : SA

What is the final value of the start node S computed by AO*?

Enter a number. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEOUS CHARACTERS. **Answer format: 17**

Answer (Numeric):**Accepted Answer : 44****Your score : 0**[Discussions \(0\)](#)

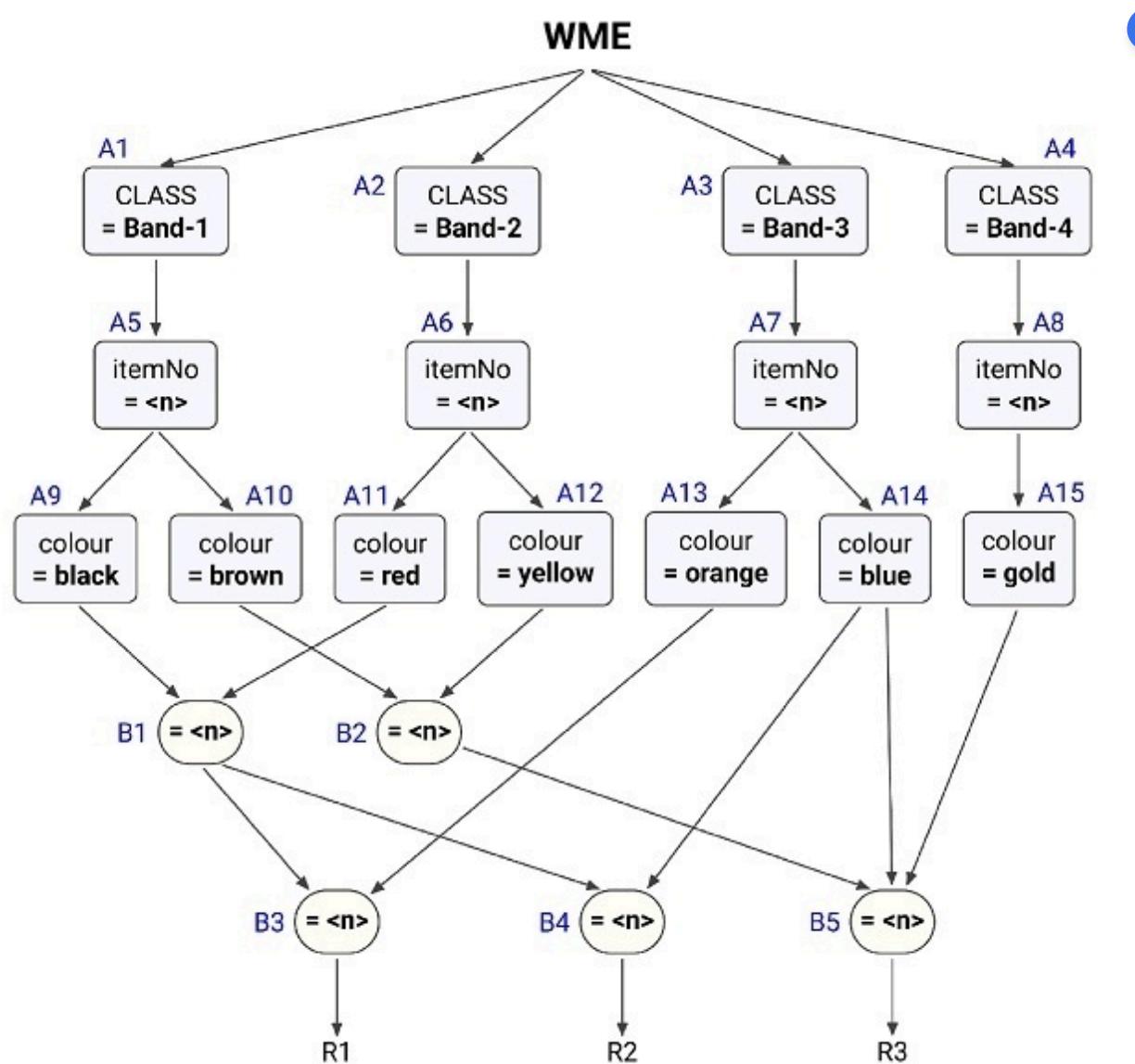
Question 23 : 6406531250068

Total Mark : 0.00 | Type : COMPREHENSION

RULE BASED EXPERT SYSTEMS

A small part of the Rete Net for classifying resistors is shown in the figure. The labels A1, A2, ..., A10, A11, ..., B1, ..., B5 uniquely identify the nodes in the network. When required, use the above label ordering to **break ties** and to select the correct 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 small part of the Rete Net for classifying resistors is shown in the figure. The labels A1, A2, ..., A10, A11, ..., B1, ..., B5 uniquely identify the nodes in the network. When

required, use the above label ordering to **break ties** and to select the correct 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.

- 201. (Band-1 ^itemNo 2B ^colour black) 
- 202. (Band-2 ^itemNo 2B ^colour yellow)
- 203. (Band-1 ^itemNo 3C ^colour brown)
- 204. (Band-2 ^itemNo 3C ^colour yellow)
- 205. (Band-2 ^itemNo 1A ^colour red)
- 206. (Band-3 ^itemNo 2B ^colour blue)
- 207. (Band-3 ^itemNo 3C ^colour blue)
- 208. (Band-4 ^itemNo 3C ^colour gold)
- 209. (Band-3 ^itemNo 1A ^colour orange)
- 210. (Band-1 ^itemNo 1A ^colour black)

Your score : 0



Question 24 :

6406531250069

 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 , 205 , 209 , 210 
- R2 , 201 , 205 , 206 
- R3 , 203 , 204 , 207 , 208 
- R3 , 201 , 202 , 206 , 208 

Your score : 0

[Discussions \(0\)](#)**Question 25 :****6406531250070**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : MCQ

If the Inference Engine uses **Specificity** as the conflict resolution strategy then identify the rule-data tuple that will be ready to fire.

OPTIONS :

- R1, 205, 209, 210
- R2, 201, 205, 206
- R3, 203, 204, 207, 208
- R3, 201, 202, 206, 208

Your score : 0

[Discussions \(0\)](#)**Question 26 :****6406531250071**[View Parent QN](#)[View Solutions \(0\)](#)

Total Mark : 1.00 | Type : MCQ

If the Inference Engine uses **Recency** as the conflict resolution strategy then identify the rule-data tuples that will be ready to fire. If multiple rule-data tuples qualify then choose one.

OPTIONS :

- R1, 205, 209, 210
- R2, 201, 205, 206
- R3, 203, 204, 207, 208

R3 , 201 , 202 , 206 , 208 

Your score : 0

 Discussions (0)**Question 27 : 6406531250072**

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)` }

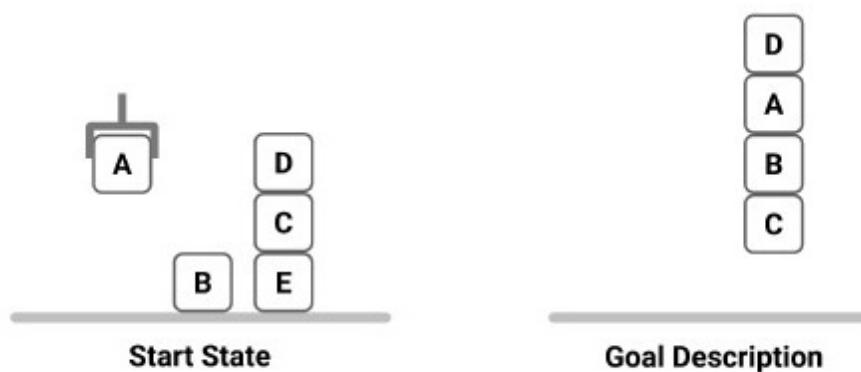
`Stack(X,Y)`: place X directly on top of Y.

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.



{ holding(A), on(D,C), on(C,E),
onTable(B), onTable(E),
clear(A), clear(B), clear(D) }

{ on(D,A), on(A,B), on(B,C) }

Your score : 0

Question 28 :
6406531250073

View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : MSQ

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

OPTIONS :

Putdown(A)

Stack(A, B)

Stack(B, C)

Stack(A, D)

Stack(D, A)

Your score : 0

Discussions (0)



Question 29 :**6406531250074**

View Parent QN



View Solutions (0)

Total Mark : 1.00 | Type : MSQ

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

OPTIONS :

- Putdown(A)**
- Stack(A, B)**
- Stack(B, C)**
- Stack(A, D)**
- Stack(D, A)**

Your score : 0

Discussions (0)

**Question 30 :****6406531250075**

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 :

- Stack(A, B) , Putdown(A)**
- Stack(A, D) , Putdown(A)**
- Stack(A, B) , Stack(A, D)**
- Pickup(B) , Putdown(A)**
- Unstack(D, C) , Putdown(A)**

Your score : 0

[Discussions \(0\)](#)**Question 31 :****6406531250076**[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(B), holding(A)**
- onTable(B), on(A,B)**
- onTable(A), on(A,B)**
- on(A,D), on(A,B)**

Your score : 0

[Discussions \(0\)](#)**Question 32 : 6406531250077**

Total Mark : 0.00 | Type : COMPREHENSION

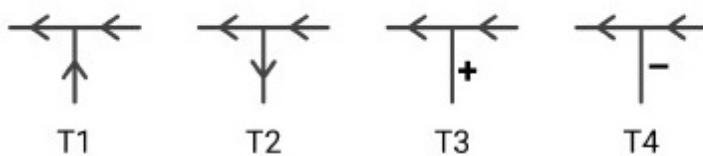
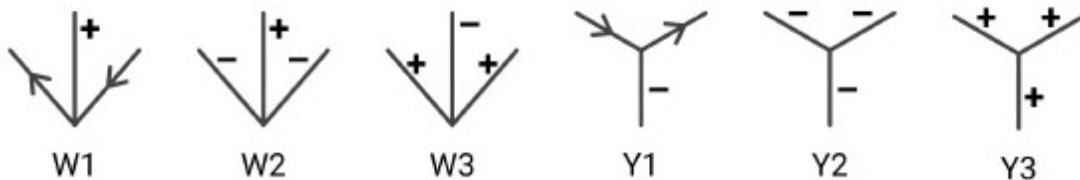
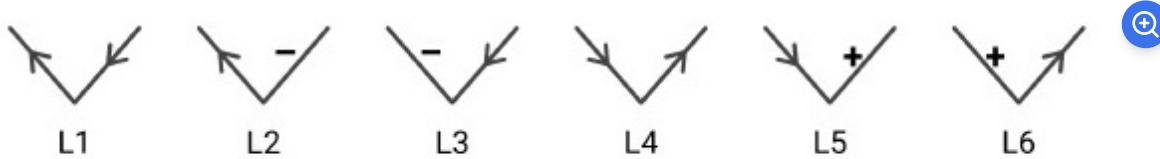
CONSTRAINT SATISFACTION

The set of junctions (L, W, Y and T type junctions) that occur in a 2D line drawing of trihedral objects is provided below. The in-plane clockwise/counterclockwise rotations of these junctions are valid as well. These junctions provide constraints on the possible edge assignments (convex, concave, arrow) for the edges/lines in 2D line drawings of trihedral objects.

The junctions carry unique labels: L1, L2, L3, L4, L5, L6, T1, T2, T3, T4, W1, W2, W3, Y1, Y2, Y3. When required, use the labels in short answers.

Note: A 2D line drawing of trihedral objects is considered to be consistent if all the edges and junctions can be assigned labels that are consistent with each other, otherwise the drawing is considered to be inconsistent and all labels are reset to NIL.

Apply a suitable algorithm to assign consistent labels to edges/junctions in the 2D line drawings in the sub-questions. Choose a suitable edge and junction order for solving the problems in the given subquestions.



Your score : 0



Question 33 :

6406531250078

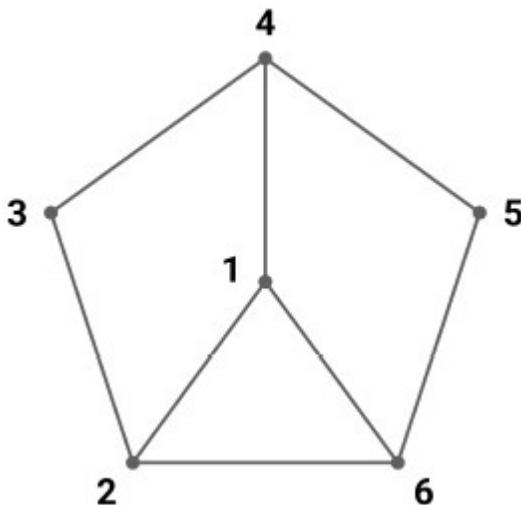
View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : SA

Assign consistent labels to all the edges and junctions in the 2D line drawing shown below. Enter the labels of the junctions 1, 2, 3, 4 in the text box, in that order. Or enter NIL if the drawing has no consistent label assignment.

Enter a comma separated list of junction labels, or enter NIL. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS. **Answer format: X9,Y9,Z9,W9**



Answer (Alphanumeric):

Answer

Accepted Answer : Y3,W1,L1,W1

Your score : 0

Discussions (0)



Question 34 :

6406531250079

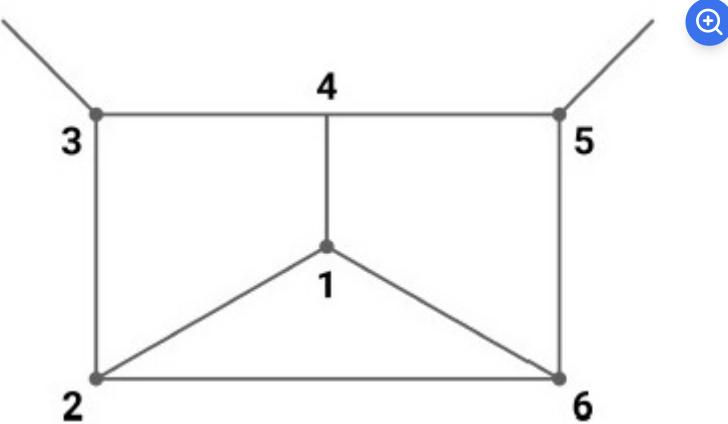
View Parent QN

View Solutions (0)

Total Mark : 1.00 | Type : SA

Assign consistent labels to all the edges and junctions in the 2D line drawing shown below. Enter the labels of the junctions 1, 2, 3, 4 in the text box, in that order. Or enter NIL if the drawing has no consistent label assignment.

Enter a comma separated list of junction labels, or enter NIL. NO SPACES, TABS, DOTS, BRACKETS OR EXTRANEous CHARACTERS. **Answer format: X9,Y9,Z9,W9**



Answer (Alphanumeric):

Answer

Accepted Answer : NIL

Your score : 0

Discussions (0)



✓ SUBMIT EXAM