# AI

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|---|---|
| **Section Id :** | 64065351451 |
| **Section Number :** | 2 |
| **Section type :** | Online |
| **Mandatory or Optional :** | Mandatory |
| **Number of Questions :** | 8 |
| **Number of Questions to be attempted :** | 8 |
| **Section Marks :** | 25 |
| **Display Number Panel :** | Yes |
| **Section Negative Marks :** | 0 |
| **Group All Questions :** | No |
| **Enable Mark as Answered Mark for Review and Clear Response :** | Yes |
| **Maximum Instruction Time :** | 0 |
| **Sub-Section Number :** | 1 |
| **Sub-Section Id :** | 640653108212 |
| **Question Shuffling Allowed :** | No |
| **Is Section Default? :** | null |

**Question Number : 20 Question Id : 640653739571 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 0**

Question Label : Multiple Choice Question

**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 :**

6406532474043. ✔ YES

6406532474044. ✖ NO

**Question Number : 21 Question Id : 640653739572 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 0**

Question Label : Multiple Choice Question


**Options :**

6406532474045. ✔ Printed graph sheets were provided to me.`

6406532474046. ✖ Printed graph sheets were not provided to me.

6406532474047. ✖ I did not use graph sheets.

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| **Sub-Section Number :** | 2 |
| **Sub-Section Id :** | 640653108213 |
| **Question Shuffling Allowed :** | Yes |
| **Is Section Default? :** | null |

**Question Number : 22 Question Id : 640653739573 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Multiple Choice Question

**STATE SPACE**

One needs to count the number of nodes visited in each cycle of DFID _____ .

**Options :**

6406532474048. ✖ to compute the complexity of search

6406532474049. ✖ to make sure that the path returned is the shortest

6406532474050. ✖ to prevent the algorithm from getting into an infinite loop on an INFINITE graph when a goal node exists in the connected component

6406532474051. ✔ to prevent the algorithm from getting into an infinite loop on a FINITE graph when the goal node does not exist in the connected component

**Question Number : 23 Question Id : 640653739574 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Multiple Choice Question

**STATE SPACE**

In the Ant Colony Optimisation algorithm for solving the TSP _____ .

**Options :**

6406532474052. ✖ all the ants in the colony start from the same start city and then go in different directions

6406532474053. ✖ all ants construct the solution using a collaborative filtering approach

6406532474054. ✔ each ant constructs a tour independently

6406532474055. ✖ each ant constructs a tour using follow the leader principle

**Sub-Section Number :** 3

**Sub-Section Id :** 640653108214

**Question Shuffling Allowed :** Yes

**Is Section Default? :** null

**Question Number : 24 Question Id : 640653739575 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2 Max. Selectable Options : 0**

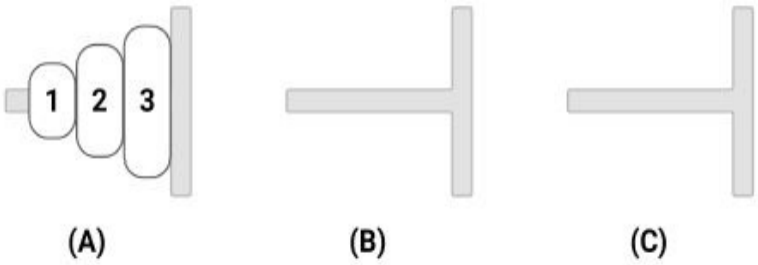
Question Label : Multiple Select Question

**STATE SPACE**

Model the tower of Hanoi problem having three pillars (A,B,C) and three disks (1,2,3) as a state space search problem. Each pillar essentially acts like a stack, where only the disk at the top of the stack is accessible.

A move involves popping a disk from one stack and pushing to another stack, where only one disk can be transferred in a single move.

A state is represented as a tuple (a,b,c), where a, b and c, respectively, represent the disks present in the stacks A, B and C. For example, (123,NIL,NIL) represents the state shown in the figure.




From (123,NIL,NIL), moving disk 1 to stack B yields (23,1,NIL) and subsequently moving disk 2 to stack C yields (3,1,2) and then moving disk 3 to stack B yields (NIL,31,2). These three moves can be depicted as:

```
(123,NIL,NIL) --> (23,1,NIL) --> (3,1,2) --> (NIL,31,2)
```

Starting from (123,NIL,NIL), which of the following states are reachable in 3 moves that do not repeat any states along a path, like `x --> y --> x`.

**Options :**

6406532474056. ✔ (13,NIL,2)

6406532474057. ✔ (NIL,3,21)

6406532474058. ✖ (1,3,2)

6406532474059. ✖ (NIL,NIL,123)

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|---|---|
| **Sub-Section Number :** | 4 |
| **Sub-Section Id :** | 640653108215 |
| **Question Shuffling Allowed :** | No |
| **Is Section Default? :** | null |

**Question Id : 640653739576 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Question Numbers : (25 to 32)**

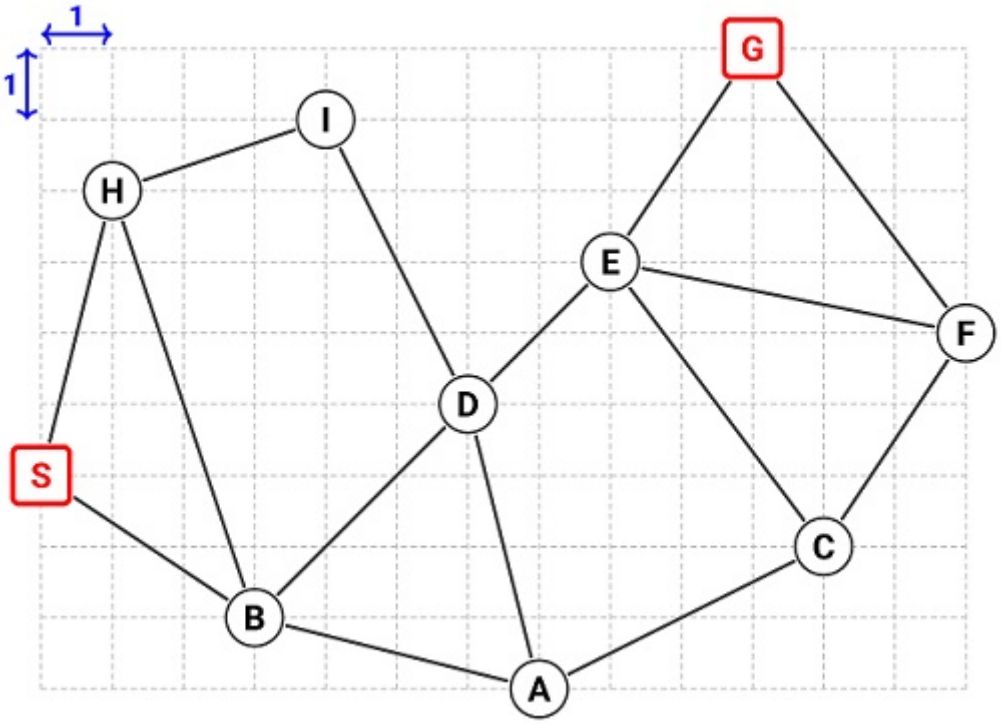
Question Label : Comprehension

**SEARCH**

The figure shows a map with several locations on a grid where each tile is 1x1 in size. The locations are at grid points and are connected by either two-way edges (shown as undirected edges) or one-way edges (shown with one arrowhead).

Take S as the start node and G as the goal node. The MoveGen function returns neighbours in alphabetical order. The RemoveSeen procedure removes neighbours already present in OPEN/CLOSED lists.

Use Manhattan distance when needed.




When we say a node is inspected/expanded/refined it means: the node is picked up from OPEN, and goal test is called, if goal test fails then MoveGen is called and depending on the algorithm the neighbours are selectively placed in OPEN.

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 25 Question Id : 640653739577 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

List the first 4 nodes inspected by Depth First Search. List the nodes in the order they were inspected. If the algorithm terminates early then list the nodes inspected up until termination.

Enter a comma separated list of node labels.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

**Answer Format: S,X,Y,Z**

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

S,B,A,C

**Question Number : 26 Question Id : 640653739578 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

What is the path found by Depth First Search?

Enter the path as a comma separated list of node labels.

Enter NIL if there is no path.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

**Answer Format: S,X,Y,G**

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

S,B,A,C,E,G

**Question Number : 27 Question Id : 640653739579 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

List the first 4 nodes inspected by Breadth First Search. List the nodes in the order they were

inspected. If the algorithm terminates early then list the nodes inspected up until termination.

Enter a comma separated list of node labels.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

**Answer Format: S,X,Y,Z**

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

S,B,H,A

**Question Number : 28 Question Id : 640653739580 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Short Answer Question

What is the path found by Breadth First Search?

Enter the path as a comma separated list of node labels.

Enter NIL if there is no path.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

**Answer Format: S,X,Y,Z,G**

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

S,B,D,E,G

**Question Number : 29 Question Id : 640653739581 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

List the first 4 nodes inspected by Best First Search. List the nodes in the order they were inspected. If the algorithm terminates early then list the nodes inspected up until termination.

Enter a comma separated list of node labels.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

**Answer Format: S,X,Y,Z**

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

S,H,I,D

**Question Number : 30 Question Id : 640653739582 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Short Answer Question

What is the path found by Best First Search?

Enter the path as a comma separated list of node labels.

Enter NIL if there is no path.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

**Answer Format: S,X,Y,Z,G**

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

S,H,I,D,E,G

**Question Number : 31 Question Id : 640653739583 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

List the first 4 nodes inspected by Hill Climbing. List the nodes in the order they were inspected. If the algorithm terminates early then list the nodes inspected up until termination.

Enter a comma separated list of node labels.
NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

**Answer Format: S,X,Y,Z**

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

S,H,I

**Question Number : 32 Question Id : 640653739584 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

What is the path found by Hill Climbing?

Enter the path as a comma separated list of node labels.

Enter NIL if there is no path.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

**Answer Format: S,X,Y,Z,G**

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

Nil

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|---|---|
| **Sub-Section Number :** | 5 |
| **Sub-Section Id :** | 640653108216 |
| **Question Shuffling Allowed :** | No |
| **Is Section Default? :** | null |

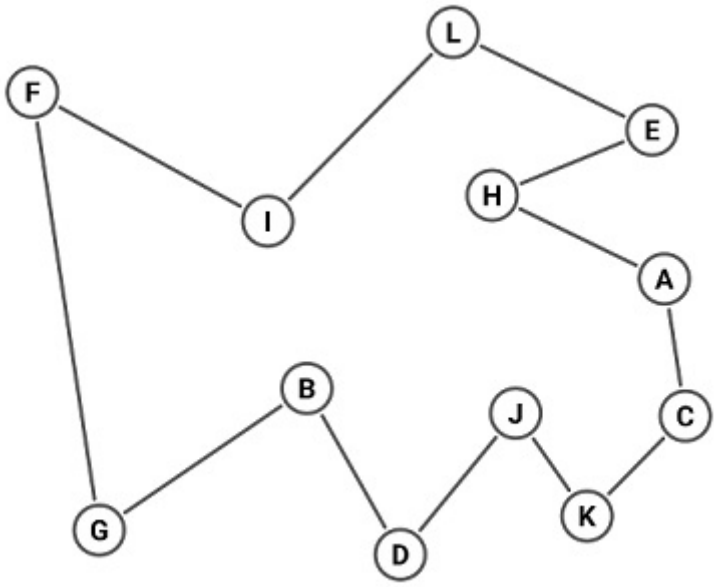
**Question Id : 640653739585 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Question Numbers : (33 to 36)**

Question Label : Comprehension

**Genetic Algorithm**

A tour of 12 cities is shown below. The edges are bi-directional. Use A,B,...,L as the reference (index) sequence to prepare tour representations.




Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 33 Question Id : 640653739586 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Select the valid path representations of the tour.

**Options :**

6406532474068. ✔ F,I,L,E,H,A,C,K,J,D,B,G

6406532474069. ✔ C,K,J,D,B,G,F,I,L,E,H,A

6406532474070. ✖ F,I,L,E,H,A,C,K,J,D,B,G,F

6406532474071. ✖ C,K,J,D,B,G,F,I,L,E,H,A,C

**Question Number : 34 Question Id : 640653739587 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1 Max. Selectable Options : 0**

Question Label : Multiple Select Question

Select the valid adjacency representations of the tour.

**Options :**

6406532474072. ✔ C,G,K,B,H,I,F,A,L,D,J,E

6406532474073. ✔ H,D,A,J,L,G,B,E,F,K,C,I

6406532474074. ✖ C,G,K,B,J,I,H,A,L,D,F,E

6406532474075. ✖ H,D,A,J,L,K,B,G,F,E,C,I

**Question Number : 35 Question Id : 640653739588 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Multiple Choice Question

Convert the path representation E,A,D,C,J,L,K,F,G,I,H,B to ordinal representation.

**Options :**

6406532474076. ✔ 5,1,3,2,6,7,6,2,2,3,2,1

6406532474077. ✖ 6,8,10,5,6,1,2,5,4,2,1,1

6406532474078. ✖ 5,1,3,2,3,4,3,1,2,3,2,1

6406532474079. ✖ 5,1,3,2,3,4,3,4,2,1,1,1

**Question Number : 36 Question Id : 640653739589 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 2**

Question Label : Short Answer Question

Two tours in path representation are given below. Generate offspring using Partially Mapped Crossover (PMX), use the locations from 5 to 8 as the mapping segment. Enter one of the child tours in the textbox.

P1: F,I,L,E,H,A,C,K,J,D,B,G

P2: E,A,D,C,J,L,K,F,G,I,H,B

Enter a comma separated list of cities.
DO NOT ENTER SPACES, TABS, DOTS,
BRACKETS OR EXTRANEOUS CHARACTERS.

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Set

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

E,L,D,F,H,A,C,K,G,I,J,B

C,I,A,E,J,L,K,F,H,D,B,G

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|---|---|
| **Sub-Section Number :** | 6 |
| **Sub-Section Id :** | 640653108217 |
| **Question Shuffling Allowed :** | No |
| **Is Section Default? :** | null |

**Question Id : 640653739590 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Question Numbers : (37 to 41)**

Question Label : Comprehension

**TSP**

The distance matrix for 6 cities and corresponding edge costs (in sorted order) are provided

below. Use this information to construct TSP tours.

| | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| A | - | 66 | 32 | 18 | 73 | 40 |
| B | 66 | - | 92 | 14 | 81 | 60 |
| C | 32 | 92 | - | 26 | 16 | 52 |
| D | 18 | 14 | 26 | - | 68 | 80 |
| E | 73 | 81 | 16 | 68 | - | 84 |
| F | 40 | 60 | 52 | 80 | 84 | - |

| BD | CE | AD | CD | AC |
|---|---|---|---|---|
| 14 | 16 | 18 | 26 | 32 |

| AF | CF | BF | AB | DE |
|---|---|---|---|---|
| 40 | 52 | 60 | 66 | 68 |

| AE | DF | BE | EF | BC |
|---|---|---|---|---|
| 73 | 80 | 81 | 84 | 92 |

Based on the above data, answer the given subquestions.

**Sub questions**

**Question Number : 37 Question Id : 640653739591 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

Start from city E and construct a tour using Nearest Neighbour Heuristic. Enter the path representation of the tour starting from city E.

Enter a comma separated list of city names.
NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.
Answer format: E,X,Y,Z

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

E,C,D,B,F,A

**Question Number : 38 Question Id : 640653739592 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

What is the cost of the tour generated by Nearest Neighbour Heuristic?

Enter a number.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: 17

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

229

**Question Number : 39 Question Id : 640653739593 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

Construct a tour using Greedy Heuristic. Enter the path representation of the tour starting from city E.

Enter a comma separated list of city names.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: E,X,Y,Z

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Set

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

E,F,B,D,A,C

E,C,A,D,B,F

**Question Number : 40 Question Id : 640653739594 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

What is the cost of the tour generated by Greedy Heuristic?

Enter a number.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: 17

**Response Type :** Numeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Equal

**Text Areas :** PlainText

**Possible Answers :**

224

**Question Number : 41 Question Id : 640653739595 Question Type : SA Calculator : None**

**Response Time : N.A Think Time : N.A Minimum Instruction Time : 0**

**Correct Marks : 1**

Question Label : Short Answer Question

Take E as the fulcrum node and compute the missing values in the savings list given below.

Construct the savings tour. Enter the path representation of the tour starting from city E.

| AB | AC | AD | AF | BC | BD | BF | CD | CF | DF |
|---|---|---|---|---|---|---|---|---|---|
| 88 | 57 | 123 | 117 | 5 | ? | ? | 58 | 48 | 72 |

Enter a comma separated list of city names.

NO SPACES, TABS, DOTS, BRACKETS, PARENTHESIS OR UNWANTED CHARACTERS.

Answer format: E,X,Y,Z

**Response Type :** Alphanumeric

**Evaluation Required For SA :** Yes

**Show Word Count :** Yes

**Answers Type :** Set

**Answers Case Sensitive :** No

**Text Areas :** PlainText

**Possible Answers :**

E,B,D,A,F,C

E,C,F,A,D,B

## Deep Learning

| | |
|---|---|
| **Section Id :** | 64065351452 |
| **Section Number :** | 3 |
| **Section type :** | Online |
| **Mandatory or Optional :** | Mandatory |
| **Number of Questions :** | 12 |
| **Number of Questions to be attempted :** | 12 |
| **Section Marks :** | 50 |
| **Display Number Panel :** | Yes |