

# Artificial Intelligence

## (CS4039)

Date: OCT 19<sup>th</sup>, 2024

Course Instructor(s)

Mr. M Usman Anwer

## Lab Midterm

Total Time(Hrs): 2:30

Total Marks: 50

Total Questions: 2

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Roll No

Section

Student Signature

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Attempt all the questions.

### Question 1 (Marks = 30)

A 4x4 puzzle is given with initial and goal state. You are required to find the optimum solution to reach the final stage through A\* algorithm.

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15	2	3	4
12	11	5	1
9	7	8	6
10	13	-	14

Initial State

?

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	-

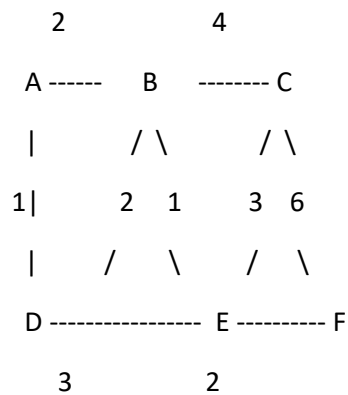
Final State

Use A\* algorithm to find the final state from initial state.

### Question 2 (Marks = 20)

Imagine a network of computers where each node represents a server, and each edge between the nodes represents a direct communication link between two servers. The cost of each link varies based on factors such as bandwidth, latency, or energy consumption. The goal is to find the least-cost path for transmitting data from one server to another.

You are tasked with routing a data packet from **Server A** to **Server F** in a computer network. The network has varying costs associated with each link (based on bandwidth, latency, etc.). Your goal is to find the least-cost path that ensures the data packet is transmitted with minimal total cost.



### Graph Representation

The graph is defined with nodes and edges between them. Each edge has a cost associated with it.

A: Connected to B (cost 2), and D (cost 1)

B: Connected to A (cost 2), D (cost 2), C (cost 4), and E (cost 1)

C: Connected to B (cost 4), E (cost 3), and F (cost 6)

D: Connected to A (cost 1), B (cost 2), and E (cost 3)

E: Connected to B (cost 1), D (cost 3), C (cost 3), and F (cost 2)

F: Connected to C (cost 6) and E (cost 2)

Apply uniform cost search(UCS) to find the path with lowest cost from server A to server F.