COMSATS University Islamabad
ABBOTTABAD CAMPUS
MIDTERM FALL 2025

Class:	BCS-6C	Date:	2 3 / 1 0 / 2025
Subject:	Artificial Intelligence Lab	Instructor:	Zeenat Zulfiqar
CLO:	CLO 6	Max Marks:	30
Student Name:		Roll Number:	

Instructions:

- **Read the paper carefully and attempt all the questions.**
- **Understanding all questions is part of the exam.**
- **Write your answers in a Google Colab and upload the file before the due date on CUI.**
- **Write your name and registration ID on the first page of your Google Colab.**
- **The submission of answer copy(ies) will be considered acceptable through CUI only. Therefore, do not submit your document through email or any other medium.**
- **Timely submission is required; even 01 min later, the exam will not be accepted at all.**
- **Convert Google Colab file to PDF file. Double-check your PDF file before uploading it on CUI to ensure that you have uploaded the correct file with your answers.**
- **Assign zero marks to those who have not attended the viva.**

CLO-6:

Question 1:

A robot named **ReOrder** is trapped in a **control grid** consisting of 8 movable panels and one empty slot. Each tile is labeled 1-8, and the empty slot (0) allows tiles to move. The robot must rearrange the tiles to restore the control system by reaching the target configuration.

Rules:

1. Only the blank tile (0) can move up, down, left, or right.
2. Only one move is allowed at a time.
3. The robot must reach the **goal state** safely and efficiently.

Tasks:

1. Represent the 3×3 puzzle grid as a Python list.
2. Implement the **BFS**, **DFS**, and **A*** algorithms to solve the puzzle.
3. Use **Manhattan Distance** as the heuristic in **A*.**

4. Display the full sequence of puzzle states from the start to the goal.