Assignment: Adversarial Search and Game Playing in AI

Course Code: CS3151
Topic: Adversarial Search and Game Strategies
CLO: CLO2 – Implement classical artificial intelligence techniques
Total Marks: 20
Submission Deadline: 28-06-2025

Question 1: Understanding Adversarial Search (5 marks)

a. Define adversarial search in the context of AI.
b. Differentiate between deterministic and non-deterministic games with one example each.
c. List and describe the main components of a game environment used in adversarial search.

Question 2: Minimax Algorithm (6 marks)

a. Describe the minimax algorithm. How does it work in a two-player zero-sum game?
b. Draw a simple 3-level game tree and manually apply the minimax algorithm to assign utility values.
c. Explain why minimax assumes both players play optimally.

Question 3: Alpha-Beta Pruning and Multiplayer Games (6 marks)

a. Explain alpha-beta pruning and how it improves the performance of minimax.
b. Illustrate alpha-beta pruning on a game tree example (you may draw or describe in text).
c. How does the approach change for multiplayer games (more than two players)? Briefly explain the differences in strategy.

Question 4: Resource Constraints and Non-determinism (3 marks)

a. Why are resource limitations (e.g., time, memory) important in adversarial search?
b. What strategies can be employed to handle these limitations effectively?
c. Briefly explain how non-deterministic games are handled in AI (mention any relevant algorithms or strategies).