**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).