Evalis-GT University

# Data Structures & Algorithm

Subject: Data Structures                                    Exam Type: End Semester
Duration: 180 minutes                                              Total Marks: 40

*Instructions: Review all questions. This is a question paper only with no answer spaces provided.*

**Q1. Evaluate the impact of a specific operating system feature (e.g., multitasking, security features) on user productivity and overall system performance. Provide evidence to support your evaluation. [10 marks]**

**Q2. Compare and contrast recursion and iteration, providing at least three examples illustrating their respective strengths and weaknesses in solving common programming problems.  Justify your choices with concrete evidence. [10 marks]**

**Q3. A C++ function is needed that counts the occurrences of a specific character within a string.  Implement this function using a `for` loop.  Explain your implementation clearly, commenting your code effectively.  Analyze the time complexity of your solution and discuss potential improvements. [10 marks]**

**Q4. Define database normalization and explain its primary purpose. Briefly describe one common normalization technique (e.g., 1NF, 2NF, 3NF). [2 marks]**

**Q5. Compare and contrast the characteristics of client-server and peer-to-peer networks, providing specific examples of their use. [2 marks]**

**Q6. Describe the process a compiler undertakes to translate high-level source code into machine code, explaining the key stages involved and the significance of each stage in ensuring program execution.  Justify your answer by referencing at least two specific compiler optimization techniques. [6 marks]**