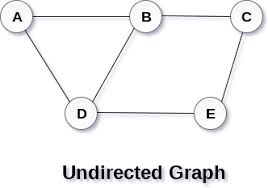


**FACULTY OF ENGINEERING, SCIENCE & TECHNOLOGY**

|  |  |  |  |
| --- | --- | --- | --- |
| **Course Code/ Title:** | | **ASSESSMENT ACTIVITY:** | **Semester**: |
| Data Structures and Algorithms | | Assignment -02 |  |
|  |  |  |  |
| **Final Date:**  15/09/2024 | | **OBE Target:** | **Weight of Marks:** |
| CLO-1& 3 and GAs 2 & 4 | 10% (10 Marks of Total) |
|  | |  |  |
| **Student Name:** | | **Teacher:** | **Score:** |
| **Student ID:** |  | Zubair Sajid |
|  |  |
|  |  |  |  |

**Question # 01**

*Consider the following undirected graph:*

1. *Represent this graph using an* ***adjacency matrix*** *and an* ***adjacency list****.*
2. *Perform a* ***Depth-First Search (DFS)*** *starting from vertex A and list the nodes in the order they are visited.*

**Question # 02**

*A retail company needs to organize its product IDs in ascending order to improve search efficiency. The product IDs are as follows: [54, 23, 77, 31, 12, 65, 89]. Apply the* ***Merge Sort*** *algorithm to sort these product IDs.*

* *Show all intermediate steps during the merge process.*
* *Also, explain the time and space complexity of the Merge Sort algorithm.*

**Question # 03**

*A warehouse management system needs to quickly arrange inventory IDs. The inventory IDs are given as: [39, 12, 45, 22, 89, 56, 73]. Use the* ***Quick Sort*** *algorithm to sort the IDs, taking the first element as the pivot.*

* *Demonstrate the partitioning steps at each stage.*
* *Discuss the best-case and worst-case time complexity of Quick Sort and explain in which scenarios these complexities are encountered.*

**Examiner Signature:** **Student Score:**