# INSTITUTE OF AERONAUTICAL ENGINEERING

**(AUTONOMOUS)**

Code No: **BCS002**

**MODEL QUESTION PAPER - II**

M.Tech I Semester Regular Examinations

**DATA STRUCTURES AND PROBLEM SOLVING**

(Computer Science and Engineering)

Time: 3 hours Max. Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

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**UNIT - I**

1. (a) Define linked list. What are the various types of linked lists? Discuss about single linked list and its applications with an example. [7M]
   (b) Explain the structure of heap and discuss various operations to be performed on heap with an example? [7M]

2. (a) Explain the concept of ADT and also explain linear list ADT, stack and queue ADTs. Define queue and discuss the operations of de queue? [10M]
   (b) Describe the Big Oh, omega and theta notations along with their worst case, best case and average case. [4M]

**UNIT - II**

3. (a) Describe dictionary. Explain the operations of dictionary with a program and illustrate the process of it's procedure. Illustrate the process of it's procedure. [8M]

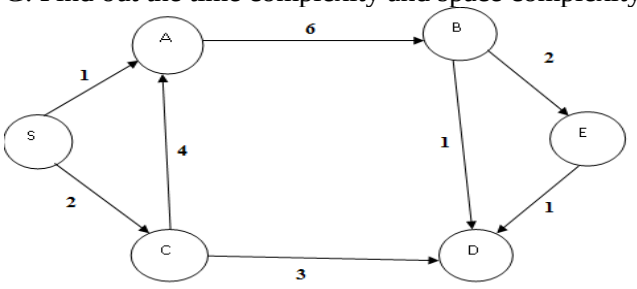
   (b) Define hashing. Explain any two hashing techniques with a program along with their advantages and disadvantages. [6M]

4. (a) What is hashing? Explain the purpose of hashing and explain different hashing methods with an example. [7M]

   (b) Illustrate hash functions, collision resolution and separate chaining along with their advantages and disadvantages? [7M]

**UNIT - III**

5. (a) Define graph. Illustrate matrix representation of a graph and linked list representation of a graph? [7M]
   (b) Illustrate Dijkstra's algorithm and construct a single source shortest path of graph G. Find out the time complexity and space complexity




[7M]

6. (a) Define binary tree. Explain about the binary tree with a program and illustrate the properties of binary trees [10M]

(b) Explain recursive traversals, non recursive traversal and threaded binary tree along with different examples? [4M]

**UNIT - IV**

7. (a) What is binary search tree ADT and explain insertion, deletion and searching operations with an example. [7M]

(b) Explain the differences between binary search tree and AVL tree and give their applications. Write an algorithm for finding the parent of a given node by considering appropriate trees? [7M]

8. (a) What is AVL tree? Write down the different operations of AVL tree with an example? [7M]

(b) Define binary search tree. Write a program for finding the smallest and largest values in the binary search tree. Write the applications of binary search tree. [7M]

**UNIT - V**

9. (a) Explain red-black tree operations with numerals and splay tree operations with numerals. [7M]

(b) Define search trees and discuss the differences between the various search trees and also give their comparisons? [7M]

10. (a) Illustrate Huffman decoding algorithm for image compression and explain with an example? [7M]

(b) Describe about the failure function. Write a program on KMP algorithm and also explain with numerals. [7M]