I B. Tech II Semester Regular/Supplementary Examinations, July/August-2023
DATA STRUCTURES
(Common to CSE, IT, CSE-AI&ML, CSE-AI, CSE-DS, CSE-AI&DS, AI&DS)

Time: 3 hours   Max. Marks: 70

Answer any five Questions one Question from Each Unit
All Questions Carry Equal Marks
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UNIT-I

1 a) What is meant by time complexity? How do we analyze the time complexity of an algorithm? [7M]

   b) What is sorting? Explain and write an algorithm for bubble sorting and trace the algorithm with an example: set of elements - 12, 34, 89, 15, 47, 76, 29, 53, 02, 91, 66. [7M]

(OR)

2 a) What is data structure? Explain its role in problem solving? Explain the different types of data structure with suitable examples. [7M]

   b) What is the role of Pivot element in Quick sort? Explain the different cases of selection pivot element with analysis of quick sort complexity. [7M]

UNIT-II

3 a) What is single linked list? Write a pseudo code for traversal operation on the single linked list, and explain it. [7M]

   b) Explain how two polynomial expressions can be multiplied when polynomial expressions are represented in single list form. [7M]

(OR)

4 a) Explain the representation of linked list in memory. [7M]

   b) Explain the insertion and deletion of a random element from the double linked list. [7M]

UNIT-III

5 a) What is Queue? Write an algorithm for en-queue and de-queue operations and trace with an example. [7M]

   b) Explain infix to post fix conversion using stack. Give a suitable example. [7M]

(OR)

6 a) Explain the implantation stack using array representation and devise the operations. [7M]

   b) Explain about circular queues. [7M]

UNIT-IV

7 a) Construct the binary search tree for the following keys: 55, 42, 89, 34, 67, 78, 40, 22, 12, 56, 88, 65, 26, 98, 102 Perform Infix, prefix and post fix traversal for the resultant binary search tree. [7M]

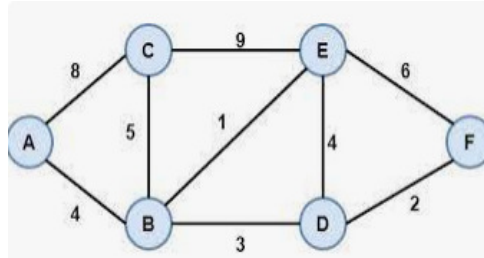   b) Explain the different types of AVL tree rotations after insertion operation. [7M]

(OR)

8 a) Explain the insertion and deletion operations on binary search tree. [7M]

   b) Define heap? Construct max heap for the following keys: 55, 42, 89, 34, 67, 78, 40, 22, 12, 56, 88, 65, 26, 98. [7M]

UNIT-V

9 a) Define Graph? Explain the two graph representation methods with suitable example.   [7M]

   b) Find the shortest path from A to F using Dijkistra's algorithm.   [7M]

(OR)

10 a) What is minimum spanning tree? Explain Kruskal's algorithm with example.   [7M]

    b) Write nonrecursive algorithm for DFS and BFS traversal. Trace the algorithm With an example.   [7M]

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UNIT-I

1 a) What is data structure? Explain its role in problem solving? Explain the different   [7M]
       operations on data structure?
   b) Explain the radix sort algorithm with an example.   [7M]

(OR)

2 a) What is meant by searching in data structures? Explain different searching   [7M]
       techniques with an algorithms and examples.
   b) Define ADT? Write an ADT algorithm header for text book inventory system. It   [7M]
       includes the following major functions
       • Ordering text books
       • Receiving text books
       • Determining retail price
       • Recording text book sales

UNIT-II

3 a) Explain the different cases for deletion operation on the single linked list.   [7M]

   b) Explain how two polynomial expressions can be added when polynomial   [7M]
       expressions are represented in single list form.

(OR)

4 a) Explain the advantages and disadvantages of single linked lists and double linked   [7M]
       lists.
   b) What is sparse matrix? Explain the representation of sparse matrix using linked list   [7M]
       implantation.

UNIT-III

5 a) Explain the implantation Queue using array representation and devise the   [7M]
       operations.
   b) Explain factorial calculation using stack. Give the suitable example.   [7M]

(OR)

6 a) What is Stack? Write an algorithm for push and pop operations and trace with an   [7M]
       example.
   b) Explain about priority queues and its applications.   [7M]

UNIT-IV

7 a) Write an algorithm for Infix, prefix and post fix traversal and trace with an   [7M]
       example.
   b) Construct the AVL tree for the following keys: [7M]
       55, 42, 89, 34, 67, 78, 40, 22, 12, 56, 88, 65, 26, 98, 102,

(OR)

8 a) What is Heap? Explain the heap sort technique with a suitable example.   [7M]

   b) Construct the binary search tree for the following keys: [7M]
       55, 42, 89, 34, 67, 78, 40, 22, 12, 56, 88, 65, 26, 98, 102
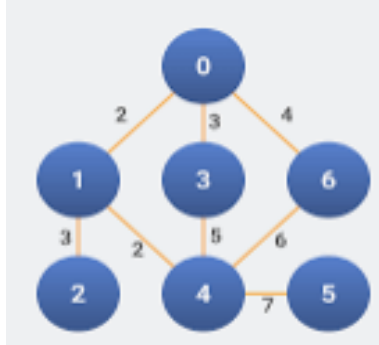   From the resultant binary search tree Delete the keys 56, 55, 67, 26

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UNIT-V

9   a)   Explain adjacency matrix and adjacency list representation for graphs.   [7M]

    b)   Write an algorithm for DFS and BFS. Trace the algorithms for the following graph   [7M]
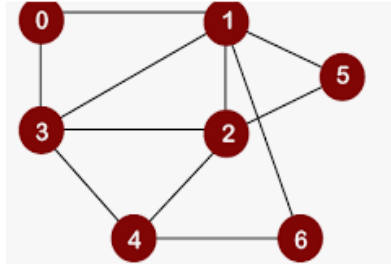
(OR)

10   a)   Explain the prim's algorithm for the following graph to find MST.   [7M]

    b)   Explain warshal's algorithm with suitable example.   [7M]

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UNIT-I

1 a) Explain big-Oh, Theta and Omega notations with suitable examples. [7M]

  b) Explain insertion sort algorithm with an example and algorithm. [7M]

(OR)

2 a) What is meant by sorting? Write a pseudo code for selection sort technique. [7M]

  b) Define ADT? Write an ADT algorithm header for railway reservation system. It includes the following major functions [7M]
  i.   Check the trains between source and destination point
  ii. Check the availability of tickets   iii. Book the ticket   iv. Cancel the ticket

UNIT-II

3 a) Explain the different cases for inserting elements in the single linked list. [7M]

  b) Explain how polynomial expression can be represented using single lists. [7M]

(OR)

4 a) What is double linked list? Explain the insertion and deletion operations on it. [7M]

  b) Explain how a single linked list can be reversed. [7M]

UNIT-III

5 a) Explain the implementation Queue using linked list representation and devise the operations. [7M]

  b) Explain evaluation of post fix arithmetic expression using stack. Give the suitable example. [7M]
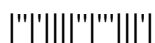
(OR)

6 a) Explain the implementation Stacks using array representation and devise the operations. [7M]

  b) Explain about priority queues and its applications. [7M]

UNIT-IV

7 a) What are the properties of Binary tree? Explain the representation binary tree using arrays. [7M]

  b) Define heap? Construct max heap for the following keys: [7M]
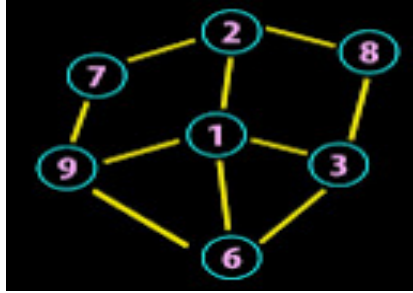 55, 42, 89, 34, 67, 78, 40, 22, 12, 56, 88, 65, 26, 98

(OR)

8 a) What is binary search tree? Explain lists properties? Explain the insertion operation and deletion operations on the binary search tree? [7M]

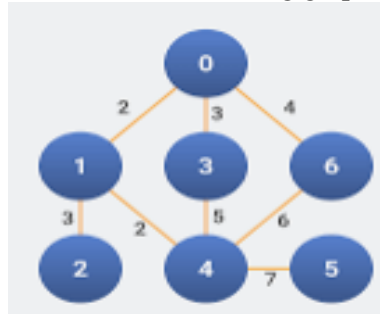 b) Explain two rotation operations on deletion of element from AVL tree. [7M]

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UNIT-V

9 a) What is graph? Explain different types of graphs with suitable examples.   [7M]
- Directed and undirected
- Weighted and un weighted

   b) Write an algorithm for DFS and BFS traversal? Trace the algorithm for the   [7M]
following graph.

(OR)

10 a) Explain the Kruskal's algorithm for the following graph to find MST.   [7M]

   b) What is single source shortest path algorithm? Explain with an example.   [7M]

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UNIT-I

1 a) What is an algorithm? Explain how can the efficiency of an algorithm be analysis? [7M]

   b) Write and explain the algorithm for merge sort. Give an example. [7M]

(OR)

2 a) What are the different time complexity notations of the algorithms? Explain them with examples. [7M]

   b) What is meant by sorting? Write a pseudo code for bubble sort technique. [7M]

UNIT-II

3 a) What is single linked list? Explain the implementation of single linked list? [7M]

   b) Devise the insertion and deletion operations on circular linked list. [7M]

(OR)

4 a) What is sparse matrix? Explain the representation of sparse matrix using linked list implantation. [7M]

   b) Write a pseudo code for printing the elements in reverse order. [7M]

UNIT-III

5 a) Explain the implantation Stacks using linked list representation and devise the operations. [7M]

   b) Explain about the circular queues and its applications. [7M]

(OR)

6 a) Explain evaluation of post fix arithmetic expression using stack. Give the suitable example. [7M]

   b) What is Queue? Write an algorithm for enqueue and dequeue operations and trace with an example [7M]

UNIT-IV

7 a) What is a binary tree? Explain its properties and the linked representation of binary tree with neat sketch. [7M]

   b) Explain the four-rotations on insertion operation in AVL tree [7M]

(OR)

8 a) Define heap? Explain its properties. Construct the min heap for the following keys:55, 42, 89, 94, 34, 67, 78, 40, 22, 12, 56, 88, 65, 26 [7M]

   b) Explain the different binary tree traversal techniques with suitable examples. [7M]

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UNIT-V

9 a) What is minimum spanning tree? Explain two algorithms for finding MST for the   [14M]
        given graph.
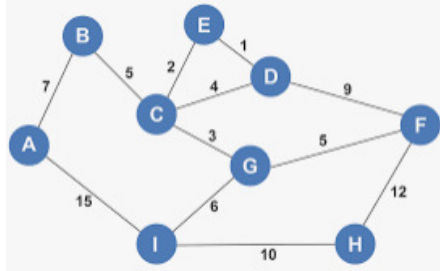
(OR)

10 a) Write and explain the single shortest path algorithm. Trace the algorithm for the   [7M]
        following graph. (Path from A to F)
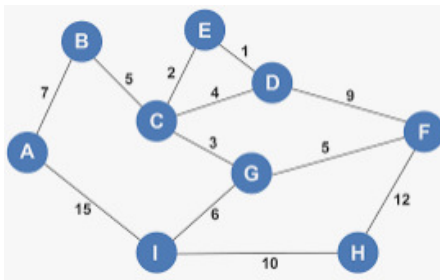
   b) Write a short note on representation on graphs using linked list and Transitive   [7M]
        Closure.

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