Code No: R1932023

R19

SET - 1

III B. Tech II Semester Regular Examinations, June-2022
DATA STRUCTURES
(Electrical and Electronics Engineering)

Time: 3 hours   Max. Marks: 75

Answer any **FIVE** Questions **ONE** Question from **Each unit**
All Questions Carry Equal Marks
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UNIT-I

1 a) What is an Abstract Data Type? Write ADT for stacks and explain in detail. [8M]

   b) How to calculate time complexity of a program? Explain time complexity calculation for matrix addition program. [7M]

(OR)

2 a) What is a multi-dimensional array? How is it different from regular array? What are the advantages of multi-dimensional array? Explain in detail. [8M]

   b) What are the applications of stacks? Explain postfix evaluation with an example. [7M]

UNIT-II

3 a) What is a Pointer? Explain about pointer arrays with examples. [8M]

   b) What are the advantages and disadvantages of Arrays? Why do we choose linked lists over Arrays? [7M]

(OR)

4 a) Write an algorithm to insert a node at the beginning of a linked list. Explain with an example as well. [8M]

   b) Write an algorithm to implement Queue as a linked list. [7M]

UNIT-III

5. a) What is the difference between binary tree and binary search tree? Construct a binary search tree with the following elements and illustrate the same step-by-step:
45, 26,27,58,42,56,77,16,90 [8M]

   b) What are the different traversal techniques implemented in tree data structure? Explain each of them with example. [7M]

(OR)

6 a) Construct a full binary tree using the following preorder and postorder traversal of a given tree:
Preorder traversal : { 1, 2, 4, 5, 3, 6, 8, 9, 7 }
Postorder traversal: { 4, 5, 2, 8, 9, 6, 7, 3, 1 } [8M]

   b) What are the operations that can be performed on a binary search tree? Explain with an example. [7M]

UNIT-IV

7 a) What is the terminology used in Graph Theory? Explain about shortest path routing algorithm with example.   [8M]

   b) Differentiate DFS versus BFS algorithm in graph traversals.   [7M]

(OR)

8 a) Illustrate Matrix representation for the following graph in Fig.1.   [8M]
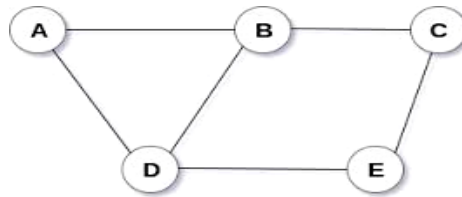

Fig.1   **Undirected Graph**

   (i)   adjacency Matrix representation
   (ii) Cut-set Matrix representation

   b) What is a minimum cost spanning tree? Write a suitable algorithm to calculate minimum cost spanning tree for a given graph. Explain with a neat diagram.   [7M]

UNIT-V

9 a) Write Algorithm for Linear Search.   [8M]
   Illustrate search criteria in the given list of elements:
   13 9 25 11 38 64 42 20
   (i) Search for 38   (ii) Search for 69

   b) What is Hashing? What are the different techniques used in hashing? Explain.   [7M]

(OR)

10 a) Illustrate Quick sort for the following elements step by step and explain: 23,56,14,34,58,97,72,69,36.   [8M]

   b) Compare shell sort and heap sort with a suitable example.   [7M]

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UNIT-I

1 a) Define Abstract Data Type. Write ADT for Queues and explain in detail. [8M]

   b) What are the operations that can be performed on a linear Array? Explain with examples. [7M]

(OR)

2 a) Write an algorithm for solving towers of honai problem. [8M]

   b) What are the disadvantages of a regular Queue? How can we overcome them using circular Queue. Explain with an example. [7M]

UNIT-II

3 a) Define pointer. Differentiate pointer arrays and array of pointers. Explain each of them with an example. [8M]

   b) What are the operations that can be performed on a linked-list? [7M]

(OR)

4 a) What is a circular linked-list? Explain with an example. [8M]

   b) Write pseudo code for deleting an element from the linked list in the middle. [7M]

UNIT-III

5. a) Define Tree data structure. What is a binary Tree? Explain about terminology used in tree data structure? [8M]

   b) What is meant by threaded binary tree? Explain the impact of such a representation on the tree traversal procedure. [7M]

(OR)

6 a) What is a Height-balanced tree? Explain LL rotation and RR rotation in AVL trees. [8M]

   b) Construct binary tree given the pre-order traversal and in-order traversal as follows: [7M]
      Pre-order traversal: G B Q A C K F P D E R H
      In-order traversal : Q B K C F A G P E D H R

UNIT-IV

7 a) Write an algorithm to traverse the graph using depth first search (DFS) with a suitable example.   [8M]

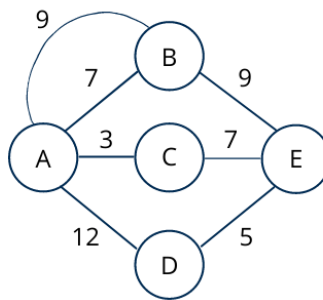   b) Find the minimum cost spanning tree using prims algorithm for the following graph in Fig.1.   [7M]

Fig.1

(OR)

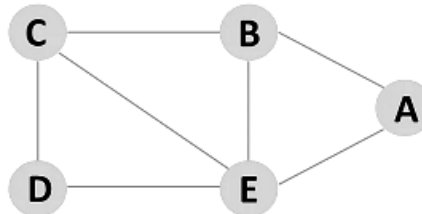8 a) Illustrate the BFS traversal for the given graph in, Fig.2, using Queues.   [8M]

Fig.2

   b) Write and explain about Dijkstra's algorithm to find the shortest path of a given graph.   [7M]

UNIT-V

9 a) Write Algorithm for Binary Search.   [8M]
      Illustrate search criteria in the given list of elements:
                13 19 25 31 38 42 51 65 77 95
      (i) Search for 77   (ii) Search for 12

   b) Explain about Double Hashing and Quadratic Hashing with an example.   [7M]

(OR)

10 a) Write algorithm for Insertion sort. Perform Insertion sort for the following elements: [8M]
                23, 56, 14, 34, 58, 97, 72, 69, 36.

    b) Explain about Recursive merge sort with suitable example.   [7M]

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UNIT-I

1 a) Write an algorithm for implementing stacks using Arrays. Explain with an example. [8M]

   b) Explain the concept of priority queues with an example. What are the advantages of priority queues? [7M]

(OR)

2 a) illustrate the following postfix expression evaluation step by step using stack data structure: 5 6 + 7 4 - * [8M]

   b) How is a double-ended Queues different from regular queues? Explain with an example. [7M]

UNIT-II

3 a) Explain the procedure of searching an element in the linked-list. Explain with an example. [8M]

   b) What are the advantages and disadvantages of a single linked list? Why do we use doubly linked-lists? [7M]

(OR)

4 a) Write an algorithm to insert a node at a specified position in the middle of the linked-list. Explain with an example. [8M]

   b) What is the difference between implementation of stack using arrays and implementation of stacks using linked-list? Explain in detail. [7M]

UNIT-III

5. a) With the help of the diagrams construct a binary search tree (BST) with the following keys: 86,12,42,69,38,57,74,6,49,71. Also delete 42 from the constructed BST. [8M]

   b) Explain about the procedure for deleting a node having 2 sub-trees ; in Binary search tree with an example. [7M]

(OR)

6 a) How does the height balance condition managed in AVL tree while inserting a node? Explain with an example. [8M]

   b) Illustrate about insertion and deletion operation in Max-heap with suitable examples. [7M]

1 of 2

UNIT-IV

7   a)   Write an algorithm to traverse the graph using Breadth first search (BFS) with a suitable example.   [8M]

b)   Draw a complete undirected graph having five nodes. Explain the adjacency matrix representation of the same graph.   [7M]

(OR)

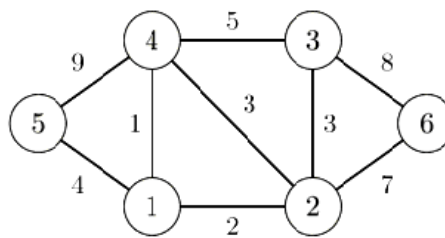8   a)   Find the minimum spanning tree for the given graph, in Fig.1, using Kruskal's algorithm.   [8M]

Fig.1

b)   What is transitive clouser of a directed graph? How to determine the transitive clouser of a graph using Warshall's Algorithm? Explain with an example.   [7M]

UNIT-V

9   a)   Write Algorithm for Fibanocci Search.   [8M]
Illustrate search criteria in the given list of elements:
        13 19 25 31 38 42 51   65 77 95
        (i)   Search for 66
        (ii)   Search for 13

b)   Explain about Separate chaining and Open addressing for Collision Handling in Hashing with examples.   [7M]

(OR)

10   a)   Write algorithm for Selection sort. Perform Selection sort for the following elements: [8M]
                23, 56, 14, 34, 58, 97, 72, 69, 36.

b)   Explain about iterative merge sort with a suitable example.   [7M]

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R19

SET - 4

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UNIT-I

1	a)	What is space complexity? How to calculate the space complexity of a program for finding factorial of a number using recursion?	[8M]
	b)	Explain about String as an ADT. What are the different operations that can be performed on strings?	[7M]

(OR)

2	a)	Convert the following infix expression to post-fix expression using Stack data structure: A + B - C*D + (P^Q) * R/S/T * X + Y	[10M]
	b)	What are the operations that can be performed on a stack? Explain with examples.	[5M]

UNIT-II

3	a)	Write an algorithm for inserting a node in the middle of the Doubly linked-list.	[8M]
	b)	How to search for an element in the single linked list? Explain with example.	[7M]

(OR)

4	a)	Write pseudo code for deleting an element from the circular linked-list.	[8M]
	b)	What are the applications of Linked-lists? How to implement sparse matrix using linked-lists. Explain.	[7M]

UNIT-III

5.	a)	What is the difference between Max-heap and Min-Heap? Explain with an example.	[8M]
	b)	Explain about B-Trees insertion operation with an example.	[7M]

(OR)

6	a)	Explain about RL rotation in AVL trees by illustrating an example.	[8M]
	b)	Write about m-way search trees and operations on it in brief.	[7M]

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UNIT-IV

7 a) Write the Kruskal's algorithm for finding minimum cost spanning tree or a given graph. Explain with an example. [8M]

   b) Explain about DFS traversal for the given graph, in Fig.1, using stacks. [7M]
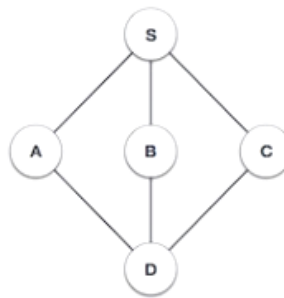

Fig.1

(OR)

8 a) What are the different ways available for representing graphs? Give all the representations for the given graph in Fig.2. [8M]

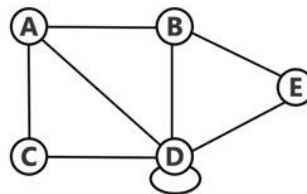
Fig.2

   b) Write and explain about All-pairs shortest path algorithm with an example. [7M]

UNIT-V

9 a) Compare and illustrate Linear search, Binary search and Fibonacci search algorithms with an example. [8M]

   b) What is hashing? Explain about Double hashing and rehashing with suitable examples. [7M]

(OR)

10 a) Write algorithm for Bubble sort. Perform bubble sort for the following elements: [8M]
       23, 56, 14, 34, 58, 97, 72, 69, 36

   b) Write algorithm for Quick sort and explain with an example. [7M]

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