Code No: R201208 **R20** SET - 1

I B. Tech II Semester Regular/ Supplementary Examinations, August- 2022

DATA STRUCTURES THROUGH C

(Only for EEE)

Time: 3 hours Max. Marks: 70

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

Unit- I

1. a) Define an algorithm. Describe commonly used asymptotic notations and give Their significance. (7M)
   b) Give the structure of Queue ADT. Explain the operations in it. (7M)

Or

2. a) Explain representation of arrays along with their advantages and disadvantages. (7M)
   b) What is a stack? Explain overheads caused by stack in recursion with a suitable Example. (7M)

Unit- II

3. a) Discuss about transposing of a sparse matrix with an example. Also write a function for its implementation. (7M)
   b) Write a program for the implementation of circular linked list. (7M)

Or

4. a) Write an algorithm to reverse a given linked list after insertion and deletion. (7M)
   b) Write an algorithm to implement queue using linked list. (7M)

Unit- III

5. a) What is a binary tree? Construct a binary tree given the pre-order traversal and in-order traversals 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
   b) Give the analysis of insertion and deletion operations of nodes in binary search tree. (7M)

Or

6. a) Explain the construction of Threaded Binary Tree? Write the algorithm. (7M)
   b) Construct max heap for the following: Uith program (7M)
   135, 90 , 35 , 20 ,10 ,40 ,35 ,58 ,107 ,72 ,169 ,51 , 130, 110, 119

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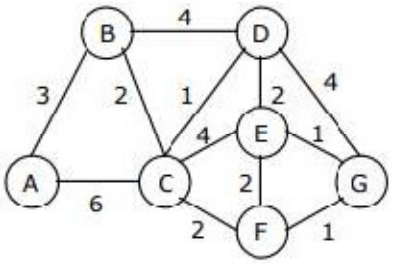
Unit- IV

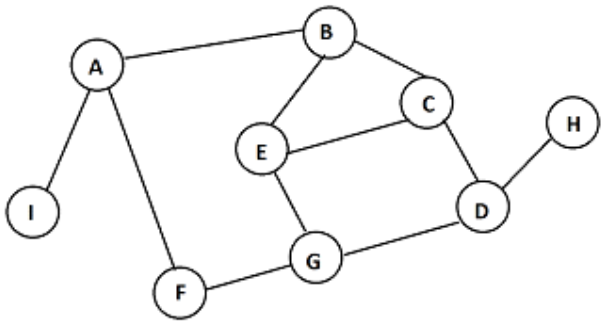
7. a) Explain how Kruskal's algorithm is used for finding the minimum spanning tree of a graph. Find a minimum cost spanning tree of the following graph using Kruskal's algorithm (7M)



b) What is Graph? Explain how to Insert and delete of vertices and edges to the graph? Relate with spanning trees and Biconnected components. (7M)

Or

8. a) Write an algorithm for Depth First Search traversal and apply DFS to the following graph and give the traversal order. (Consider A as the Starting node) (7M)



b) What is the need of an adjacency matrix? How it differs from an adjacency lists? Explain them briefly. (7M)

Unit- V

9. a) Sort the following elements using the heap sort and present the algorithm. (7M)
34, 76, 54, 12, 38, 29, 11, 89, 8, 3, 6, 27

b) Compare various sorting algorithms. With respect to their performance. (7M)

Or

10 a) Write an algorithm for Fibonacci search and give examples. (7M)

b) Explain about shell sort with an example and program. (7M)

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Code No: R201208 **R20** SET - 2

I B. Tech II Semester Regular/ Supplementary Examinations, August- 2022

DATA STRUCTURES THROUGH C

(Only for EEE)

Time: 3 hours Max. Marks: 70

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

Unit- I

1. a) Define data structure. Discuss different types of data structures and their implementations, applications. (7M)

   b) Explain Towers of Hanoi problem with example? Write a recursive algorithm? (7M)

Or

2. a) Discuss the procedure to evaluate postfix expression. Evaluate the following postfix expression 7 3 4 + - 2 4 5 / + * 6 / 7 +? (7M)

   b) "Queues can be implemented using two stacks" - Support this statement with suitable programming example. (7M)

Unit- II

3. a) Write an algorithm to insert, delete and display the elements in a given doubly linked list. (9M)

   b) How to represent Sparse Matrix using Single Linked List? Discuss. (5M)

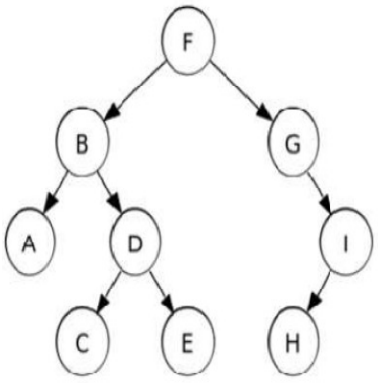
Or

4. a) Explain how linked list can be used for representing polynomials using a suitable example. (7M)

   b) Discuss the advantages and disadvantages of representing a group of items as an array versus a linear linked list. (7M)

Unit- III

5. a) Consider the following tree: (7M)



   i) Post-order traversal of the tree
   ii) Level-order traversal of the tree
   iii) What is the depth of the tree?

   "Is it a complete binary tree" - Justify

   b) Define binary search tree. Show how to insert and delete an element from binary search tree. (7M)

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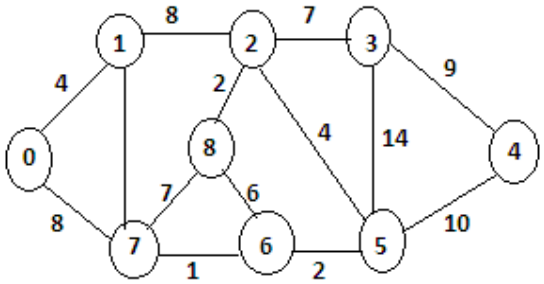
Or

6. a) Create a B-tree of order 5 by inserting the following elements one after the other: 3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, and 19. (7M)

   b) Write an algorithm to insert and delete an element in max heap. (7M)

Unit- IV

7. a) Explain how Prim's algorithm is used for finding the minimum spanning tree of a Graph. Find a minimum cost spanning tree of the following graph using Prims algorithm (7M)



   b) Write an algorithm to traverse the graph using Breadth First Search with a suitable example? (7M)

Or

8. a) What are connected components and biconnected components of graph? Explain with example. (7M)

   b) What is Transitive Closure? Explain in detail its role in all paints shortest path problem. (7M)

Unit- V

9. a) Describe insertion sort algorithm and trace the steps of insertion sort for sorting the list- 12, 19, 33, 26, 29, 35, 22. (7M)

   b) Discuss Fibonacci search with example and algorithm. (7M)

Or

10 a) Sort the following elements using the radix sort and explain the program. (7M)
314, 726, 534,1 12, 378, 299, 101, 869, 8, 3, 6, 27

   b) Write an algorithm for binary search and discuss with example. (7M)

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Code No: R201208 **R20** SET - 3

I B. Tech II Semester Regular/ Supplementary Examinations, August- 2022

DATA STRUCTURES THROUGH C

(Only for EEE)

Time: 3 hours Max. Marks: 70

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

Unit- I

1. a) What is an array? Discuss different types of array with examples. (7M)
   b) Write an algorithm to insert and delete a key from circular queue. (7M)

Or

2. a) Convert given Infix expression: (a - b / c ^ d) / (e + f * g) to Postfix expression using Stack and show the details of Stack at each step of conversion. (7M)
   b) Write ADT for array implementation of polynomial addition. (7M)

Unit- II

3. a) What is linked list? Write an algorithm for inserting an element E at the given position P of the linked list. (7M)
   b) Write an algorithm to add two polynomials using linked list. (7M)

Or

4. a) Write an algorithm to delete and insert an element anywhere from doubly linked list. (7M)
   b) Explain the procedure to insert and delete element from sparse matrix. (7M)

Unit- III

5. a) Create a B-tree of order 5 by inserting the following elements one after the other: 3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, and 19. (7M)
   b) Explain the operations of binary tree with an example. (7M)

Or

6. a) Write a non-recursive algorithm for preorder traversal and post-order traversal in a tree with an example. (7M)
   b) Write about heap data structure. Implement various operations on max heap. (7M)

Unit- IV

7. a) Explain Warshall's algorithm to find transitive closure of a graph with a suitable Example. (7M)
   b) Write an algorithm for minimum cost spanning tree using Kruskal's algorithm. (7M)

Or

8. a) Present warshall algorithm to find the shortest paths between all pairs of nodes in a graph. (7M)
   b) Write an algorithm to traverse the graph using Depth First Search with a suitable example? (7M)

Unit- V

9. a) Explain the recursive merge sort algorithm to sort the following elements: 14, 28, 6, 8, 1, 94, 73, 7, 15, 4, 3. (7M)
   b) State and explain the binary search with example. Write the program. (7M)

Or

10. a) "Selecting the pivot element plays vital role in Quick sort" support this statement with proper explanation. Explain various choices available for selecting the pivot. (7M)
    b) Arrange the following list of elements in ascending order using Merge Sort A, L, G, O, R, I, T, H, M, S. Clearly show the sorting process at each step. (7M)

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Code No: R201208 **R20** SET - 4

I B. Tech II Semester Regular/ Supplementary Examinations, August- 2022

DATA STRUCTURES THROUGH C

(Only for EEE)

Time: 3 hours Max. Marks: 70

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

Unit- I

1. a) "One of the applications of stack is Reversing a List" Explain it with a suitable Algorithm. (7M)
   b) Define String as ADT. And briefly discuss various operations on strings. (7M)

Or

2. a) Write a non-recursive program to convert the given infix expression into postfix expression. (7M)
   b) Explain the operations of a Queue with an example. (7M)

Unit- II

3. a) Write algorithms for swapping two successive elements in a singly linked list with the first element placed at position P. (7M)
   b) Write an algorithm to insert and delete an element from circular linked list. (7M)

Or

4. a) Write an algorithm to push and pop an element from linked stack. (7M)
   b) Write an algorithm to insert an element anywhere from doubly linked list. (7M)

Unit- III

5. a) Show that the maximum number of nodes in a binary tree of height H is $2^{H+1} - 1$. (7M)
   b) With the help of 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. (7M)

Or

6. a) Discuss representation of binary tree using arrays and linked list. (7M)
   b) Define priority queue. Discuss briefly about the heap representation of priority queue. (7M)

Unit- IV

7. a) Define minimum spanning tree? And describe the prim's algorithm to find minimum spanning tree with an example. (7M)
   b) What are different ways of representing a graph? Explain using suitable example. (7M)

Or

8. a) What are connected components of graph? Is there a method to find out all the connected components of graph? Explain. (7M)
   b) Explain All Pairs shortest path algorithm to find transitive closure of a graph with a suitable example. (7M)

Unit- V

9. a) Differentiate between iterative merge sort and recursive merge sort. With algorithm. (7M)
   b) Write a program to sort the elements using radix sort. Give example. (7M)

Or

10. a) Rearrange following numbers using quick sort: algorithm and explain. (7M)
    10, 6, 3, 7, 17, 26, 56, 32, 72
    b) State and explain heap sort write the program with example. (7M)

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