Code No: R1632024 **R16** SET - 1

III B. Tech II Semester Regular Examinations, April/May - 2019

DATA STRUCTURES

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) Define data structure. [2M]
   b) What is a double-ended-queue? [2M]
   c) What is a self referential structure? Give an example. [2M]
   d) Discuss the role of mid element in binary search. [3M]
   e) Construct the graph whose adjacency matrix is given below and also analyze its properties. [3M]

$$
\begin{array}{c c}
 & \begin{array}{cccccc} A & B & C & D & E & F \end{array} \\
\begin{array}{c} A \\ B \\ C \\ D \\ E \\ F \end{array} &
\begin{bmatrix}
0 & 1 & 0 & 0 & 1 & 1 \\
1 & 0 & 1 & 0 & 0 & 1 \\
0 & 1 & 0 & 1 & 1 & 0 \\
0 & 0 & 1 & 0 & 0 & 1 \\
1 & 0 & 1 & 0 & 0 & 0 \\
1 & 1 & 0 & 1 & 0 & 0
\end{bmatrix}
\end{array}
$$

   f) Present the time complexity of merge sort in different cases. [2M]

PART -B

2. a) Explain about different notations for time complexity and space complexity of algorithms. [7M]
   b) Write a C program to traverse an array in reverse order. [7M]

3. a) Discuss the role of stacks in executing recursive procedures. [7M]
   b) What is a priority queue? Explain different methods of implementing them. [7M]

4. a) Write a C function to implement insert operation in a circular linked list. [7M]
   b) Explain with an example, how linked lists can be used for sparse matrix representation and computations. [7M]

5. a) What is a threaded binary tree? Discuss its advantages and limitations. [7M]
   b) Insert the sequence of integers 13, 3, 4, 12, 14, 10, 5, 1, 8, 2, 7, 9, 11, 6 and 18 in an initially empty Binary Search Tree. Then delete 5 and 1. (Present the operations one after the other in the same order). [7M]
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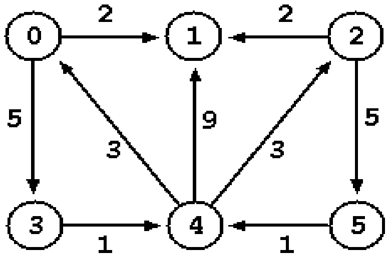
6. a) Compute shortest paths between every pair of vertices in the graph below using appropriate algorithm. [7M]



b) Write notes on basic operations performed on graphs and challenges involved. [7M]

7. a) Write and explain Fibonacci Search algorithm. [7M]

b) Sort the below list of elements in ascending order using heap sort: [7M]
6, 8, 7, 9, 1, 4, 3, 2, 5, 0.

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2. Answer **ALL** the question in **Part-A**
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PART –A

1. a) Give the syntax for declaring a 3-dimensional array. [2M]
   b) Write brief notes on polish notation. [3M]
   c) What is a spare matrix? Give an example. [2M]
   d) What are balanced binary trees? Why it is needed to balance binary trees? [2M]
   e) Define the terms: simple graph, directed graph and connected graph. [3M]
   f) What is stable sorting? Give an example. [2M]

PART -B

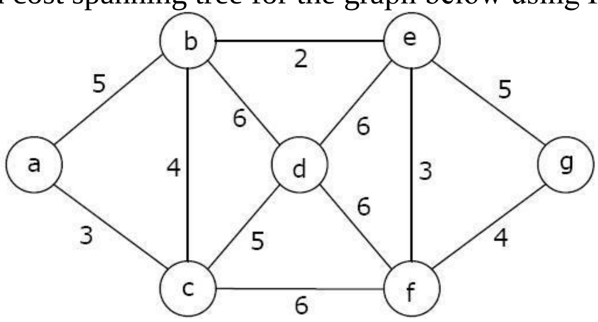
2. a) Write about the classification of data structures. [7M]
   b) Explain about different operations in String ADT. [7M]

3. a) Write an algorithm/program that gives solution for Towers of Hanoi problem with n disks. [7M]
   b) With array representation, explain the basic queue operations. [7M]

4. a) Write a C program to traverse a given single linked list in reverse order. [7M]
   b) Explain with an example, how linked lists can be used for polynomial representation. [7M]

5. a) Discuss about different representations of binary trees. Give an example for each. [7M]
   b) Insert the sequence of integers 10, 20, 30, 40, 50, 60, 70, 80 and 90 in an initially empty B-Tree. Then delete 40 and 70. (Present the operations one after the other.) [7M]

6. a) Differentiate between BFS and DFS with algorithms and examples. [7M]
   b) Compute minimum cost spanning tree for the graph below using Prim's algorithm: [7M]



7. a) Write and explain Binary Search algorithm. Also mention its time complexity. [7M]
   b) Sort the below list of elements in ascending order using quick sort: [7M]
   29, 23, 17, 57, 34, 89, 65, 27.

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Code No: R1632024 **R16** SET - 3

III B. Tech II Semester Regular Examinations, April/May - 2019

DATA STRUCTURES

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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PART –A

1. a) List different operations that can be performed on an array. [2M]
b) What is a queue data structure? [2M]
c) Write C structure to declare node of a double-linked list. [2M]
d) Define the terms: root, leaf and siblings with respect to trees. [3M]
e) List some real world applications of directed, undirected and hybrid graphs. [3M]
f) Present the time complexity of quick sort in different cases. [2M]

PART -B

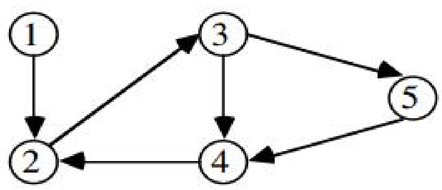
2. a) With a neat sketch, explain the model of ADT. [7M]
b) Explain how linear arrays are stored and traversed. [7M]

3. a) Explain how postfix expressions are evaluated using stacks. Give an example. [7M]
b) Differentiate between regular queues and circular queues with insert and delete operations. [7M]

4. a) Discuss the advantages and limitations of linked lists. [7M]
b) Write a C program to implement queues using linked lists. [7M]

5. a) Write recursive functions for inorder, preorder and postorder traversal in a binary tree. [7M]
b) Construct a max heap from the sequence of integers 13, 3, 4, 12, 14, 10, 5, 1, 8, 2, 7, 9, 11, 6 and 18. Then delete 2 minimum elements. (Present the operations one after the other in the same order.) [7M]

6. a) What is transitive closure? Compute transitive closure of the graph given below, using Warshall's algorithm: [7M]



b) Write and explain Kruskal's algorithm for finding minimum cost spanning tree of a graph. [7M]

7. a) Give a comparison between several searching techniques. [7M]
b) Write and explain iterative merge sort algorithm, with an example. [7M]

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Code No: R1632024 **R16** SET - 4

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DATA STRUCTURES

(Electrical and Electronics Engineering)

Time: 3 hours Max. Marks: 70

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2. Answer **ALL** the question in **Part-A**
3. Answer any **FOUR** Questions from **Part-B**

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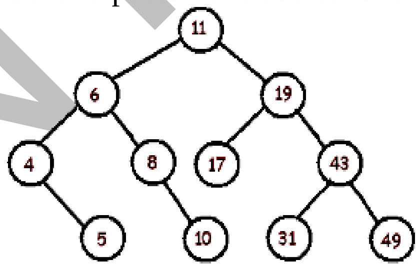
PART –A

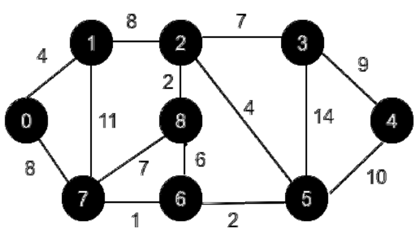
1.	a)	What is the key difference between strings and regular arrays?	[2M]
	b)	What is a stack data structure?	[2M]
	c)	Define a header linked list.	[2M]
	d)	What is a complete binary tree?	[3M]
	e)	What is a biconnected component?	[3M]
	f)	What are the limitations of binary search?	[2M]

PART -B

2.	a)	List and explain different operations performed on data structures.	[7M]
	b)	Write a C program to add two matrices, using multidimensional arrays.	[7M]
3.	a)	Explain how an infix expression can be converted into postfix expression, using stacks. Give an example.	[7M]
	b)	Write and explain the queue ADT.	[7M]
4.	a)	Differentiate between arrays and linked lists.	[7M]
	b)	Write a C program to implement stacks using linked lists, doubly and circular linked lists.	[7M]
5.	a)	Explain the procedure for deletion of an element from a binary search tree.	[7M]
	b)	Present the preorder, inorder and postorder traversal of the below binary tree:	[7M]



6.	a)	Explain about various graph representations. Discuss the pros and cons of each.	[7M]
	b)	Using Dijkstra's algorithm, find shortest paths from vertex 0 to remaining vertices in the graph given below.	[7M]



7.	a)	What is hashing? Explain its role, advantages and disadvantages w.r.to searching.	[7M]
	b)	Sort the below list of elements in ascending order using shell sort: 3 7 9 0 5 1 6 8 4 2 0 6 1 5 7 3 4 9 8 2	[7M]

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