

**II B. Tech I Semester Regular Examinations, October/November - 2017**

**DATA STRUCTURES THROUGH C++**

(Com to CSE & IT)

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 Abstraction? (2M)
- b) Convert the following expression into postfix **A-B\*C+D-E+F/G-H** (3M)
- c) What are chain iterators? (2M)
- d) Define Max heap? (2M)
- e) Define Spanning tree? (2M)
- f) Give the Best case, Average case, Worst case time complexity of Recursive Merge sort? (3M)

**PART -B**

2. a) Explain Oops Concepts? (7M)
- b) Discuss about representation of polynomial using Abstract Data Type? (7M)
3. a) Write a C++ Program to pop an element from the stack? (7M)
- b) Explain different types of inheritances available in C++? (7M)
4. a) Write a C++ Program to insert an element at last position into a single linked list? (7M)
- b) Explain about equivalence class? (7M)
5. a) If number of elements in a binary search tree are N. Give two sample binary search tree where the search time is proportional to i) Log N ii) N (7M)
- b) Explain with examples different cases of deletion of elements in a binary search tree? (7M)
6. a) Write an algorithm to traverse a graph using breadth first search? (7M)
- b) Discuss about different ways of representing Graphs in memory? (7M)
7. a) Write a C++ program to sort the following elements using Recursive Merge Sort? (7M)
- b) Trace the above program for the following elements? (7M)  
**12, 25, 5, 9, 1, 84, 63, 7, 15, 4, 3**



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**PART -A**

1. a) Define Encapsulation? (2M)
- b) Where operator Stack is used? (2M)
- c) Define a node of Single linked list in C++? (2M)
- d) Can we have a binary tree whose postorder and preorder traversal same? Give example? (3M)
- e) What are connected components? (2M)
- f) Give the best case, Average case, Worst case time complexity of Insertion sort? (3M)

**PART -B**

2. a) With an example Explain the procedure of transposing a Sparse matrix? (7M)
- b) Discuss about Array as an Abstract Data Type? (7M)
3. a) Write a Program to push an element into a stack? (7M)
- b) Implement container classes using templates? (7M)
4. a) Discuss about implementing Chains with templates? (7M)
- b) Discuss about implementation of queues using linked list? (7M)
5. a) Create max heap for the following elements(**20, 12, 14, 3, 52, 15, 139, 27, 190**) (7M)
- b) What are Tree iterators? Explain (7M)
6. a) Write an algorithm to traverse a graph using Depth first search? (7M)
- b) Explain about All pairs shortest path algorithm? (7M)
7. a) Write a C++ program to sort the following elements using Insertion Sort? (7M)
- b) Trace the above program for the following elements? (7M)  
**65, 6, 54, 63, 56, 61, 14, 39, 28, 16, 30.**



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**PART -A**

1. a) What is a copy constructor? (2M)
- b) What are container classes? (2M)
- c) With a neat diagram represent 3 elements ( **10,15,19**) in double linked list? (2M)
- d) Can we have a binary tree whose inorder and postorder traversal same? Give example? (3M)
- e) Define Bi Connected components? (2M)
- f) Give the best case, Average case, Worst case time complexity of Quick sort? (3M)

**PART -B**

2. a) Explain about Polymorphism in C++ with suitable examples? (7M)
- b) Discuss about Sparse matrix representation with an example? (7M)
3. a) Write a C++ Program to insert an element in a Queue? (7M)
- b) Write an algorithm to evaluate postfix expression? (7M)
4. a) Write a C++ Program to count the number of elements present in a Single linked list? (7M)
- b) Discuss about chain manipulation operations? (7M)
5. a) Create binary search tree for the following elements ( **23, 12, 45, 36, 5, 15, 39, 2, 19**) ? Discuss about the height of the above binary search tree? (7M)
- b) What is a threaded binary tree? Give an example with neat diagram of inorder traversal of threaded binary tree (7M)
6. a) Explain Kruskal Algorithm? (7M)
- b) With an example explain Single Source shortest path algorithm? (7M)
7. a) Write a C++ program to sort the following elements using Quick Sort? (7M)
- b) Trace the above program for the following elements? (7M)  
**66, 5, 45, 36, 65, 15, 39, 66, 56, 55**



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**PART -A**

1. a) Define Sparse matrix? (2M)
- b) What are the uses of templates in C++? (2M)
- c) With a neat diagram represent 4 elements ( **21, 30, 12, 11**) in Circular linked list? (2M)
- d) Can we have a binary tree whose inorder and preorder traversal same? Give example? (3M)
- e) What is an Articulation point? (2M)
- f) Give the best case, Average case, Worst case time complexity of Heap sort? (3M)

**PART -B**

2. a) Differentiate between Constructor and destructor? (7M)
- b) Discuss about the Polynomial Addition using Array ADT? (7M)
3. a) Discuss about Stack ADT? (7M)
- b) What are container Classes? Explain with a Sample program (7M)
4. a) How chains are represented in C++? (7M)
- b) Discuss about Linked Queues? (7M)
5. a) What are the properties of a binary tree? (7M)
- b) Write an algorithm to traverse the given binary tree in inorder? Explain with an example? (7M)
6. a) Explain Prim's Algorithm? (7M)
- b) What is Spanning tree? Explain about Depth first and breadth first Spanning trees? (7M)
7. a) Write a C++ program to sort the following elements using Heap Sort? (7M)
- b) Create Heap for the following elements and then sort them (7M)  
( **13, 102, 405, 136, 15, 105, 390, 432, 28, 444** )

