



II B. Tech I Semester Regular/Supplementary Examinations, October/November - 2018
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 **THREE** Questions from **Part-B**

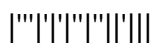
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**PART -A**

1. a) Which operation is supported by an array ADT? (2M)
- b) Elaborate the application on stack? (2M)
- c) What do you mean by amortized analysis? (2M)
- d) What is the maximum number of nodes in a binary tree of depth k? (3M)
- e) Write down complexity of selection sort and in which situation bubble sort should be used? (3M)
- f) What is Graph? Give Adjacency list representation of graph? (2M)

**PART -B**

2. a) Describe how an array can be effectively used to store a sparse matrix. (7M)
- b) Explain about polynomial representation with a suitable example? (7M)
3. a) What is priority Queue? Explain the implementation of Priority queue? Write an algorithm for operations Priority queues with an example? (7M)
- b) Perform enqueue and dequeue operations in a queue? How do they differ from circular queue operations? Explain. (7M)
4. a) Write pseudo code to add node at the end and middle positions in circular linked list? (7M)
- b) Write a C++ Program for Circular Linked List Traversal? (7M)
5. a) Describe the following terms with suitable examples (7M)
  - i) Binary Tree
  - ii) Complete Binary Tree
  - iii) Strictly Binary Tree
  - iv) Almost Complete Binary Tree
- b) Write a short note on various operations of the threaded binary tree? (7M)
6. a) Explain with an example how to delete an element to maxheap? (7M)
- b) How to solve All pairs shortest path algorithm with help of optimization function? Write the program and explain. (7M)



7. a) An array contains  $N$  numbers and you want to determine whether two of the numbers sum to a given number  $K$ . For example, if the input is 8, 4, 1, 6 and  $K$  is 10, the answer is yes (4 and 6). A number may be used twice. (10M)
- i) Give an  $O(N^2)$  algorithm to solve this problem
  - ii) Give an  $O(N \log N)$  algorithm to solve this problem.
- (Hint: first sort the array and then solve the problem in linear time.)
- b) What is Transitive Closure? Explain (5M)



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**PART -A**

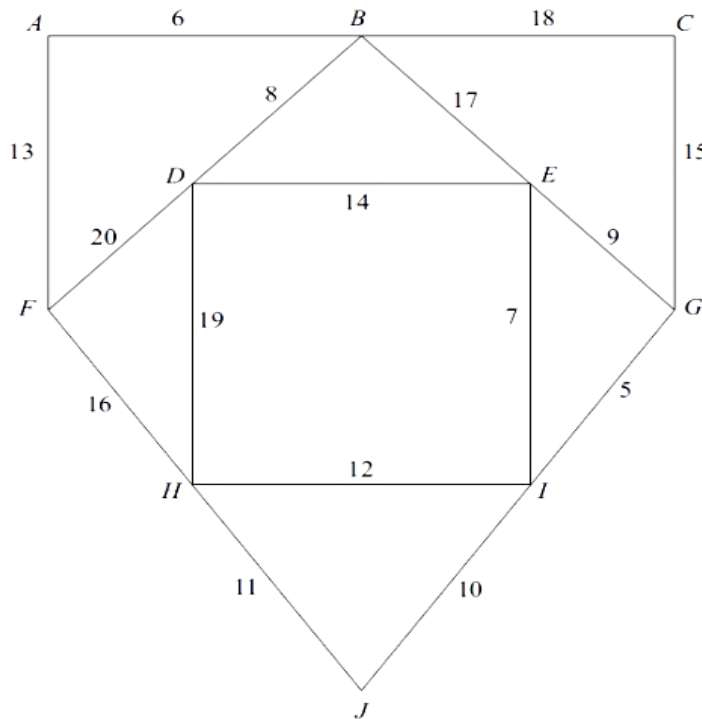
1. a) Write formula to calculate address of elements in one-dimensional array? (2M)
- b) Define Circular Queue? Write algorithm to insert element into circular queue? (3M)
- c) What is the difference between circular linked list and linear linked list? (2M)
- d) Trace the binary tree of in-order traversal: BFGPRSTWYZ? (3M)
- e) What are the applications of Graphs? (2M)
- f) What are the merits and demerits of binary search? (2M)

**PART -B**

2. a) Differentiate array and linked list representation of Stack? (7M)
- b) Explain about different kinds of ADTs with suitable examples? (7M)
3. a) Evaluate following expression. (7M)
  - i)  $10+3-2-8/2*6-7$
  - ii)  $(12-(2-3)+10/2+4*2)$
- b) Write a C++ program to evaluate postfix expressions for the above. (7M)
4. a) Write an algorithm to delete duplicates in a linked list? (7M)
- b) Explain how linked list can be used for representing polynomials using a suitable example? (7M)
5. a) Describe the following terms used in binary trees (7M)
  - i) Siblings
  - ii) Height
  - iii) Level
- b) What is a threaded binary tree? Explain insertion and deletion operations on it with an example. (7M)



6. a) A) The following network has 10 vertices A, B,.....J. the numbers on each edge represents the distances in miles between pairs of vertices. (7M)  
 i) Use Kruskal's algorithm to find the minimum spanning tree for the network?  
 ii) State the length of the spanning tree?



- b) Write an algorithm to traverse a graph using Depth first search? (7M)
7. a) How prim's algorithm is efficient on sorting data? Explain with an example? (7M)  
 b) Rearrange the following numbers using quick sort procedure 42, 12, 18, 98, 67, 83, 8, 10, 71. (7M)



