B.E. Computer Technology (C.B.S. + C.B.C.S. Pattern) / Computer Science & Engineering (CBCS Pattern) Sem-IV

# CT402 / 4BECT02 / 4BECS 02 : Data Structures

P. Pages : 3 **GUG/S/19/11909**

Time : Three Hours * 3 7 0 1 * Max. Marks : 80

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Notes : 1. All questions carry equal marks.
2. Due credit will be given to neatness and adequate dimensions.
3. Assume suitable data wherever necessary.
4. Diagrams and Chemical equation should be given wherever necessary.

**1.** a) What is sparse matrices. Write a program to create sparse Matrices. **8**

b) Write a function for recursive Quicksort and function for splitting the array for quicksort. **8**

**OR**

**2.** a) What do you mean by Ordered list. Write a function for creating array of n elements. **8**

b) Write a program for selection sort for n elements. **8**

**3.** a) Write a function for inserting and deleting element for priority queue. **8**

b) Write Applications of Stack. Also write a function for reversing a string using stack. **8**

**OR**

**4.** a) Evaluate following expressions using stack. **8**

i) $ABC+D*+$, where $A=2,\ B=3, C=4\ \&\ D=5$

ii) $+A*B+CD$

b) Write a program to perform Queue operations. **8**

**5.** a) Describe Generalized linked list. Draw Generalized list for the given list. **8**
$L=\big((1,2),\ 3,\ (4),\ ((5,\ 6),\ 7),(8)\big)$

b) Write a C program to implement stack using linked list. **8**

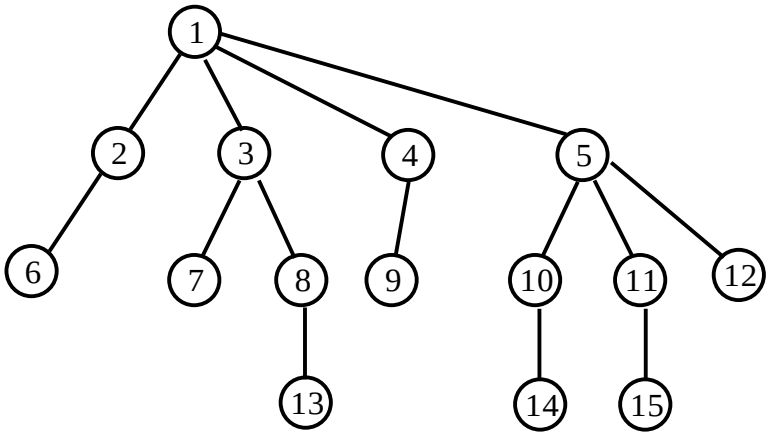
**OR**

**6.** a) Differentiate Doubly linked list and Circular linked list. **8**

b) How to represent Polynomials. Give C function to perform addition of two polynomials. **8**

**7.** a) Give difference between Binary Tree and AVL tree. **8**

b) What do mean by Basic tree or Generalized tree. Give steps to convert Generalized tree to Binary tree. **8**




**OR**

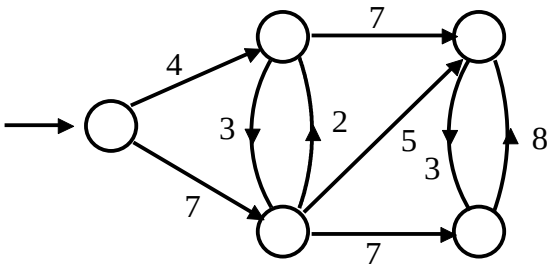
**8.** a) Define and Explain with example. **8**

i) Binary Search Tree (BST) ii) Left Skewed BST

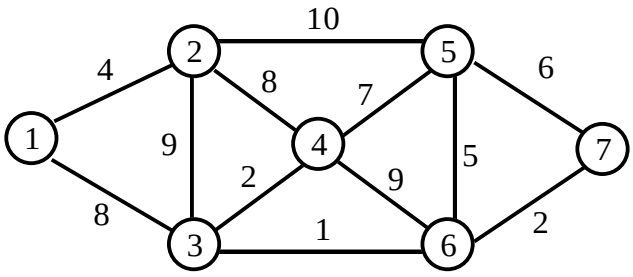
iii) Right Skewed BST d) Depth of Binary tree

b) Write a function to sort elements in BST. Also write applications of BST. **8**

**9.** a) Explain shortest path algorithm for the given graph. **8**



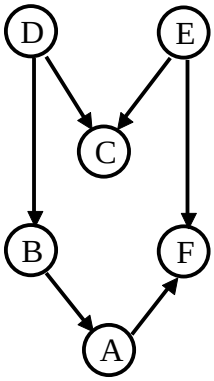

b) Why prim's better than Kruskel's? How does Prim's algorithm works? Find minimum spanning cost and tree using prim's algorithms. **8**



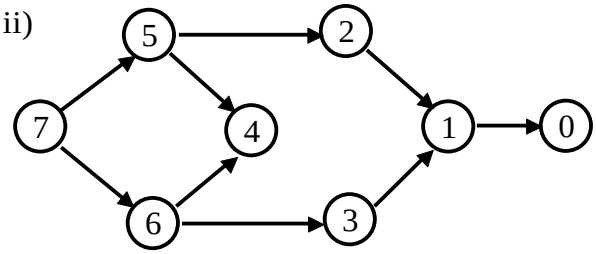

**OR**

**10.** a) What is topological sorting? Sort following graph using topological sorting techniques. **8**

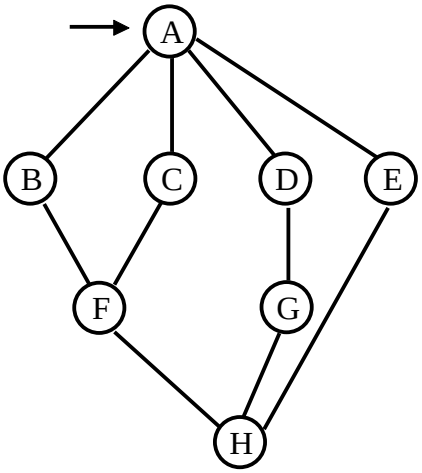
i)




ii)




b) Write a algorithm for Depth first search. Apply DFT on given graph using Stack. **8**

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