# 2019

# BCA

## 2nd Semester Examination

## Data Structure

### Paper – 1202

### Full Marks – 70

### Time : 3 Hours

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words as far as practicable.*

*Question No. **1** and any **four** from the rest.*

1. Answer any **five** questions : 2×5=10

   (a) What is the postfix expression for the following infix expression ?

   A+B* (C+A)/C

   (b) What is the sequence of values popped out of stack when the following sequence of operations are performed on a stack ?

   PUSH (10), PUSH (20), POP, PUSH (10), POP, PUSH (20)

(c) What is the number of distinct binary trees with 3 nodes ?

(d) What is the no. of internal nodes of degree 2 in binary tree that has n leaf nodes ?

(e) Which data structure is good one to represent sparse matrix ?

(f) Define strictly binary tree.

(g) What is Dequeue ?

(h) What do you mean by height-balance tree ?

## GROUP – B

Answer any **four** questions : 15×4=60

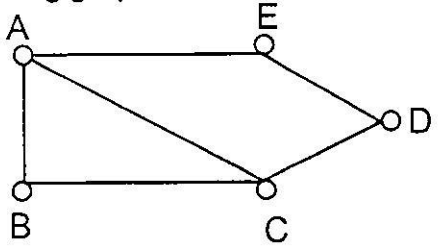
2. (a) Write an algorithm to reverse a single linked list. 5

(b) Suppose, we use linked list to represent a polynomial . Show how do we represent the following polynomial : $10x^7+5x^4+3x^2+6$. 4

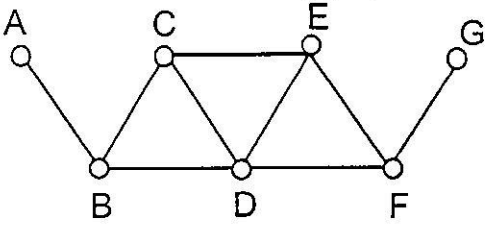
(c) Show how can we represent the following sparse matrix ? 6

$$\begin{bmatrix} 1 & 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 \\ 1 & 0 & 0 & 1 & 0 \end{bmatrix}$$

3. (a) Show both adjacency matrix representation and adjacacy list representation of the following graph. 3+3




(b) Consider the following graph :




Show the order of node traversals if you use BFS graph traversal technique and start from vertex A. Show the content of queue in every step. 5

(c) Write recursive Binary search algorithm. 4

4. (a) Show the every step of constructing binary search tree if you are given the following list of nodes : 5

16, 7, 15, 20, 9, 2, 6

(b) Show the post-order traversal order of nodes in the binary search tree obtained in above question 4(a). 4

(c) Give algorithm Bar in-order binary tree traversal. 5

(d) Define binary tree. 1

5. (a) Write the algorithm of insertion sort. 5
(b) What is linear probing in Hashing ? 3
(c) Write an algorithm of linear search technique. 4
(d) Discuss applications of Hashing data structure. 3

6. (a) How do we represent queue data structure ? 3
(b) How do we detect if a queue is empty for a non-circular queue ? 3
(c) Write the pop operation algorithm of a stack. 3
(d) Define B-tree. 3
(e) What do you mean by complete binary tree? Give example. 2+1

7. (a) Write the Dijkstra's algorithm to find shortest path between two vertices in a graph. Show an example. 5+3
(b) Write an algorithm to delete a node from a single linked-list. 5
(c) Write one advantage and disadvantage of array over linked list. 2

8. Write short notes on any **three** : 5×3
(a) Priority queue
(b) Merge sort
(c) Collision resolve techniques in Hashing
(d) Bi-connected graph

[Internal Assessment – 30 marks]