BCA-302

DATA STRUCTURE WITH C

Time Allotted: 3 Hours   Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP A
(Multiple Choice Type Questions)

1. Answer any *ten* questions.   10×1 = 10

   (i) Which of the following abstract data types can be used to represent a many to many relation?

   (A) tree   (B) plex

   (C) graph   (D) both (B) and (C)

   (ii) The average search time of hashing, with linear probing will be less if the load factor

   (A) is for less than one   (B) equals one

   (C) is for greater than one   (D) none of these

   (iii) Heap allocation is required for languages

   (A) that support recursion

   (B) that support dynamic data structure

   (C) that use dynamic scope rules

   (D) all of these

   (iv) Which the following need not to be a binary tree?

   (A) search tree   (B) heap

   (C) AVL-Tree   (D) B-Tree

(v) Consider a linked list of n element which is pointed by an external pointer. What is the time taken to delete the element which is successor of the element pointed to by a given pointer?

(A) O(1)

(B) O(log2 n)

(C) O(n)

(D) O(n log2 n)

(vi) A linear collection of data elements given by means of pointer is called

(A) linked list

(B) node list

(C) primitive list

(D) none of these

(vii) Which of the following is a collection of items into which items can be inserted arbitrarily and from which only the smallest item can be removed?

(A) descending priority queue

(B) ascending priority queue

(C) fifo queue

(D) none of these

(viii) A _____search begins the search with the element that is located in the middle of the array

(A) serial

(B) random

(C) parallel

(D) none of these

(ix) Which of the following data structures may give overflow error, even though the current number of element in it is less than its size?

(A) simple queue

(B) circular queue

(C) priority queue

(D) none of these

(x) The time complexity of linear search algorithm over an array of n elements is

(A) $O(\log_2 n)$

(B) $O(n)$

(C) $O(n \log_2 n)$

(D) $O(n^2)$

(xi) A binary tree in which if all its levels except possibly the last, have the maximum number of nodes and all the nodes at the last level appear as far left as possible, is called

(A) full binary tree

(B) binary search tree

(C) threaded tree

(D) complete binary tree

(xii) Which of the following sorting algorithms does not have a worst case running time of O (n²)?

(A) insertion sort   (B) merge sort

(C) quick sort   (D) bubble sort

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.   3×5 = 15

2. Convert from infix to postfix the expression   5
A+(B–C/E*(F+G)–M)

3. Write an algorithm for Insertion sort of an array.   5

4. Make Binary Search Tree from the following numbers and do Inorder, Preorder and Postorder traversals: 5
56,34,45,37,48,87,63,75,59,94,67

5. Define the following terms-   5
a) Complete Binary Tree
b) Degree of a tree
c) Weighted graph

6. What is Hashing? Describe different Hash functions.   2+3

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.   3×15 = 45

7. (a) What is the difference between Binary Search and Linear Search? Write an algorithm for Binary Search.   3+5
(b) Write push and pop function for a stack.   7

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8. (a) Write the following functions for a linked list-   3×3=9
    (i) Insert new element in list
    (ii)Delete from a list
    (iii)Reverse a list

   (b) Write difference between-   3+3
    (1) Static and Dynamic memory allocation
    (ii) Malloc and Calloc function

9. (a) What is the problem of linear queue? How that can be solved by   2+3
    Circular queue?

   (b) Make a BST from the given traversals-   5
    Preorder: A B C F G D E I H
    Inorder: B F C G A I E H D

   (c) How a graph can be stored by different data structures? 5

10.(a) Create an AVL tree with the following numbers-   7
    56,23,35,76,87,94,62,67,71,11,15,19

   (b) Explain Threaded binary tree with example.   5

   (c) When a graph will be called a tree?   3

11.   Write short notes on any *three* of the following: 3×5
   (a) DFS
   (b) 8 Queens problem
   (c) Circular Linked List
   (d) Dequeue
   (e) ADT