Total No. of Questions : 8] [Total No. of Printed Pages : 3

Paper Code : 21313

F–413

B.C.A. (Third Semester) Examination, 2018

(New Course)

Paper-BCA-303-N

DATA STRUCTURES USING C

Time : 3 Hours] [Maximum Marks : 70

Note :– Attempt any *five* questions. All questions carry equal marks.

1. (a) Define Data Structures. What is the difference between linear and non-linear data structures ? What are the operations that can be performed on data structures ?

   (b) Discuss the array representation of stacks. Write the algorithm for push and pop stack operations.

2. (a) What is a Sparse Matrix ? Describe a data structure for the efficient storage of a sparse matrix.

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   (b) Write the postfix form of each of the following infix expressions :

   (i) A – B + (M $ N) * (O + P) – Q/R^S * T + Z

   (ii) K + L – M * N + (O ^ P) * W/U/V * T + Q

3. (a) What is Queue ? How is queue different from a stack ? Discuss the various operations on queues.

   (b) What is a priority queue ? How can it be implemented ? Explain an application of priority queue.

4. (a) What is doubly linked list ? What are its applications ? Explain how an element can be deleted from the list using appropriate pseudo code.

   (b) Write a program to create a linked list of names in such a way that after every insertion the list is always in sorted order.

5. (a) Define a binary tree. What do you mean by tree traversal ? Using the following traversal construct the corresponding binary tree :

   INORDER : H K D B I L E A F C M J G

   PREORDER : A B D H K E I L C F G J M

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(b) What is Hashing ? Explain various methods for resolving hash collisions.

6. (a) What is run time complexity of an algorithm ? Calculate the run time complexity of bubble sort.

(b) Explain Quick Sort with the help of suitable example.

7. (a) What is Binary Search Tree ? Write an algorithm to delete an element D from a binary search tree so that the tree remains a binary search tree.

(b) What do you mean by graph traversal ? Define depth-first traversal (DFS) of a graph. Write an algorithm of non-recursive depth-first traversal.

8. Write short notes on any *four* of the following :

(i) Complete Binary Tree

(ii) Hash functions

(iii) Adjacency matrix representation of graph

(iv) Circular Queues

(v) Overflow and underflow in linked list.

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