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4137

B.C.A. Examination, 2016

Third Semester

Second Paper

(Data Structure Using C & C++)

Time : Three Hours *Maximum Marks : 75*

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

1. (a) Define a sparse matrix. Explain an efficient way of storing sparse matrix in the memory. Write a program to find the transpose of sparse matrix using this representation. 7+8

   (b) What do you understand by row-major order and column-major order of array? Derive formula for calculating the address of an array element using base address of array.

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2. (a) What do you mean by D-queue? Explain the operation of insertion and deletion on D-queue. 7+8

   (b) Using stack, write a program to determine whether an infix expression has balanced parenthesis or not.

3. (a) Write a function to insert and delete a node in the beginning of a singly link list. 7+8

   (b) What do you mean by doubly linked list? How traversal can be done on doubly linked list.

4. (a) Construct an expression tree for the expression $(-b + \sqrt{b^2 - 4ac})/2a$. Also write pre-order, in-order and past-order traversals of the expression tree formed. 7+8

   (b) Write a program to find the solution of the Towers of Hanoi problem.

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5. (a) Create B-Tree of order 5 from the following list of data items. 7+8

20, 30, 35, 85, 10, 55, 60, 25.

(b) A binary tree T has 10 nodes. The inorder and pre-order traversals yield the following sequence :

Inorder : D B H E A I F J C G

Pre-order : A B D E H C F I J G

Draw the tree T

6. (a) Sort the following data using heap sort

92, 59, 27, 15, 13, 11, 19, 3, 4, 5

7½×2

(b) Write a c program to search a number in an array using Binary search method.

7. (a) Write a c program for selection sort.

7½×2

(b) What do you mean by hashing? Explain any five hash functions.

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8. Write short notes on any **two** of the following: 7½×2

(i) Priority queue

(ii) Binary search tree

(iii) Tree indexes

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