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MCA 2nd Semester Examination

Data Structure (C++ & Java) (N.S.)

MCA-201

Time : 3 Hours

Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt FIVE questions selecting one from each section. Section E is compulsory. All questions carry equal marks.

SECTION - A

1. (a) What are the various data types supported by C++? Explain each in detail.

   (b) What do you mean by Dynamic Memory Allocation? How
dynamic memory is allocated to a 2D array and used? Explain with the help of example.  (12)

2. (a) What is a constructor and a destructor? Explain with the
help of an example. What are the various rules
associated with the declaration and use of these.

   (b) Write an algorithm to insert an item at a given position in
array and to delete an item from a given position.  (12)

SECTION - B

3. (a) How a polynomial can be stored using linked list? Write
an algorithm stores two polynomials in two linked lists and
add them. Store the resultant polynomial in third list.

   (b) Write an algorithm to reverse the nodes of a linked list.  
   (12)
4. (a) Discuss how a single array can be used to implement two stacks. Illustrate with the help of example.
   (b) Write an algorithm to insert an item in a circular queue.  
       (12)

SECTION - C

5. (a) Write an algorithm to traverse a pre-order Threaded Binary Tree.
   (b) Write an algorithm to insert an item in a heap.  
       (12)

6. (a) Write an algorithm to remove an item from a Binary search tree.
   (b) Write an algorithm for Depth-first-search traversal of graph.  
       (12)

SECTION - D

7. (a) What is Hashing? What are the various hash functions? Discuss each with the help of suitable example.
   (b) What is omega and theta notations of measuring complexity? Discuss with example.  
       (12)

8. (a) Derive the time complexity in Big O notation of Bubble sort and Quick sort in average and worst case.
   (b) Write steps to perform Radix sort algorithm. Illustrate with example and derive its time complexity.  
       (12)

SECTION - E

   (a) Which arithmetic operation is not allowed on pointers?
   (b) How infinite loop is constructed in C++?
   (c) When a constructor is invoked?
(d) Which linear data structure is not conducive for insertion and deletion?

(e) Which data structure is used to check whether a given expression is balanced in parenthesis?

(f) Which data structure is best suitable for the implementation of priority queue?

(g) Can a Threaded Binary Tree be constructed for all traversals?

(h) What is the condition for a Binary search Tree to give search efficiency of O (log n)?

(i) Define Adjacency Matrix for the representation of graph.

(j) Explain Linear Probing for collision resolution in hashing.

(k) Define Omega notation for complexity.

(l) Which sorting method is highly space complex?

\(1 \times 12 = 12\)