S.Y. Diploma : Sem. III
[CO/CM/IF/CD/CW]

Data Structure using 'C'

Time: 3 Hrs.] Prelim Question Paper **[Marks : 100**

Instructions : (1) **All** questions are **compulsory**.
(2) Answer each next main Question on a **new** page.
(3) Figures to the **right** indicate **full** marks.
(4) Assume suitable data, if **necessary**.
(5) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

1. (a) Attempt any **SIX** of the following : **[12]**
(i) Define time complexity and Space complexity.
(ii) Define Push and Pop operations of stack.
(iii) Define Hashing.
(iv) List various sorting techniques.
(v) Define Complete binary tree.
(vi) Define Node and Pointers.
(vii) Define Data Structure.
(viii) List operations on trees.

(b) Attempt any **TWO** of the following : **[8]**
(i) Explain different approaches to design an algorithm.
(ii) Explain circular queue with example.
(iii) Describe Depth First Search.

2. Attempt any **FOUR** of the following : **[16]**
(a) Describe Big 'O' notation used in algorithm.
(b) Distinguish between Stack and Queue (Any 4 points).
(c) Write a program for Selection sort.
(d) Explain Linear search algorithm.
(e) Define terms:
(i) Node (ii) Address (iii) Null Pointer (iv) Next Pointer
(f) Explain Priority queue with its types.

3. Attempt any **FOUR** of the following : **[16]**
(a) Explain Hash functions.
(b) Explain Circular queue with example.
(c) Convert the following expression P written in postfix notation into infix:
P: 5,6,2,+,*,12,4,/,-
Also evaluate P for final value.

(d) Explain inorder, preorder and postorder traversal.
(e) Explain Graph representation with example.
(f) Explain Height balanced tree with example.

4. Attempt any **FOUR** of the following : **[16]**
(a) Define Recursion. Write 'C' program to find factorial of a number.
(b) Construct expression tree for the following :
(i) $(2a + 5b)^3(x - 7y)^4$ (ii) $(a-3b)(2x-y)^3$
(c) Explain Radix sort with example.
(d) What are the applications of Graph?
(e) What are the characteristics of an algorithm?
(f) Explain Binary search with example.

5. Attempt any **TWO** of the following : **[16]**
(a) Write an algorithm to insert new node at the beginning, at the middle and at the end of a singly linked list.
(b) Explain Linear Probing and Chaining techniques of Hashing with example.
(c) Explain Breadth First Search with example.

6. Attempt any **TWO** of the following : **[16]**
(a) Explain Quick sort with example.
(b) Write a program to read an integer number. Print the reverse of this number.
(c) Write a program to implement Queue using array.

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