Roll No. ……..

MCA–06/PGDCA–06/M.Sc.(IT)–06

Data Structure through C Language

Master of Computer Applications/P. G. Diploma in Computer Applications/Master of Science in Information Technology
(MCA/PGDCA/M.Sc.IT–11/12/16/17)
Second Semester, Examination, 2018

Time : 3 Hours **Max. Marks : 80**

Note : This paper is of **eighty (80)** marks containing **three (03)** Sections A, B and C. Attempt the questions contained in these Sections according to the detailed instructions given therein.

Section–A

(Long Answer Type Questions)

Note : Section 'A' contains four (04) long answer type questions of nineteen (19) marks each. Learners are required to answer *two* (02) questions only.

1. Write an algorithm for any *four* :
   (a) Selection Sort
   (b) Bubble Sort
   (c) Insertion Sort
   (d) Quick Sort
   (e) Merge Sort
2. Write an algorithm for inserting an element into a circular queue and delecting an element from a circular queue.
3. Write a program in 'C' language for insertion sort.

4. Write a program to implement linear linked list, showing all the operations that can be performed on a linked list.

Section–B

(Short Answer Type Questions)

Note : Section 'B' contains eight (08) short answer type questions of eight (8) marks each. Learners are required to answer *four* (04) questions only.

1. Differentiate between an array and stack.
2. Explain the following :
   (a) Binary Tree and Binary Search Tree
   (b) Complete Binary Tree
3. Derive the best, average, worst case time complexity of linear search.
4. Explain the allocation and deallocation algorithms for dynamic memory management.
5. What is complexity of an algorithm ? Explain various notations used to express the complexity of an algorithm.
6. Write short notes on the following :
   (i) Garbage collection
   (ii) Radix sort
7. What is Stack ? Give the difference between the working of stack and queue using suitable example.
8. Write short notes on the following :
   (i) Application of queue
   (ii) Dynamic storage management function
   (iii) Recursion
   (iv) Priority queue

Section–C

(Objective Type Questions)

Note : Section 'C' contains ten (10) objective type questions of one (01) mark each. All the questions of this section are compulsory.

1. A stack is an example of a ..... data structure.
   (a) FIFO
   (b) LIFO
   (c) Both (a) and (b)
   (d) None of the above

2. Which of the following data structures could be considered a recursive data structure ?
   (a) Linked list
   (b) Tree
   (c) Both (a) and (b)
   (d) None of the above

3. The time required to insert an element in a stack, with linked implementation is :
   (a) O(1)
   (b) $O(\log_2 n)$
   (c) $O(n)$
   (d) $O(n \log_2 n)$

4. The postfix equivalent of the prefix '* + *ab* – *cd* ' is :
   (a) *ab* + *cd* – *
   (b) *abcd* + – *
   (c) *ab* + *cd* * –
   (d) *ab* + – *cd**

5. Stack is useful implementing :
   (a) Radix sort
   (b) Breadth first search
   (c) Recursion
   (d) None of them

6. It is appropriate to represent a queue a :
   (a) A circular list
   (b) Doubly linked list
   (c) Linear linked list
   (d) Array

7. A linear list in which elements can be added as removed at either end but not in the middle is known as :
   (a) Queue (b) Dequeue
   (c) Stack (d) Tree

8. What data structure is used for depth first traversal of a graph ?
   (a) Queue (b) Stack
   (c) List (d) None of these

9. A linked list is dynamic structure.
   (a) True (b) False

10. Which of the following algorithms is not stable ?
   (a) Bubble Sort (b) Quick Sort
   (c) Merge Sort (d) Insertion Sort