67056

MCA 2nd Semester CBCS Scheme

w. e. f. 2016-17

Examination – May, 2019

DATA STRUCTURES USING C++

Paper : 16MCA32C1

Time : Three hours]   *[Maximum Marks : 80*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Question Number **1** will be compulsory. In addition to *compulsory* question, student will have to attempt *four* more questions selecting *one* question from each Unit.

1. Answer the following : $2 \times 8 = 16$

   (a) What is the minimum number of comparisons required to determine if an integer appears more than n/2 times in a sorted array of n integers ?

   (b) Draw the Directed graph G(V ,E), V = { 1, 2, 3, 4}, E = {(1, 2), (1 ,3), (3, 2), (3, 4), (4,3)}. Also evaluate the adjacency matrix for the above graph. How many paths of length 3 are there from 1 to 4 ? Give explanation to your answer.   6

9. (a) Write short notes on : (i) AVL Tree (ii) B-Trees   10

   (b) What is a spanning tree for a graph ? What is the condition to find spanning tree of a graph ? How is it different from a minimal spanning tree ?   6

$B \partial W (C(I - L_\lambda) + (I - L_\xi))$

(b) What is an algorithm ? Name two approaches of algorithm design.

(c) A Two dimensional Array in 'C++' is declared as int A[3][4]. Find the address of A[2] [2] if data is stored in row major ordering and address of base(A)=1000.

(d) What is the complexity of Radix sort ? Explain the terms involved.

(e) Consider that no other data structure is available what is the minimum number of stacks needed to implement a queue ? Show diagrammatically.

(f) Construct a neat diagram of a circular linked list with elements 4, 7, 1,3

(g) Construct a binary tree for the following expression : A+(B-C)*D

(h) Define Directed Graph.

UNIT – I

2. (a) What is Data Structure ? Why the study of data structure important for a developer ?   10

(b) Compare and contrast the B ig-O and small-O notation of complexity.   6

3. What do you understand by Analysis of Algorithm ? What is time and space complexity ? Explain the time-space trade off with suitable example.   16

UNIT – II

4. (a) What do you mean by Sorting ? Compare Bubble sort with Insertion sort technique.   8

(b) What is Hashing ? Explain the terms linear probing and quadratic probing.   8

5. (a) Write a C++ Program for multiplication of two matrices.   8

(b) Sort the elements 742, 651, 894, 541, 209, 113 using Radix sort.   8

UNIT – III

6. (a) Write the algorithm to convert the Infix to Postfix notation. Apply the algorithm on :   12

a/b-c+d * e-a * c

(b) What is a priority queue ? Explain any two applications of priority queues.   4

7. (a) Write an algorithm for PUSH and POP operation on a STACK.   8

(b) Draw and explain all cases of inserting a new node in a doubly linked list.   8

UNIT – IV

8. (a) What is a Binary Search tree ? Write the algorithm for Post-order traversal of Binary Search Tree.   10