2026

COMPUTER APPLICATION

Course Name : Data Structures & Algorithms

Course Code : BCA-DSC-3014

Full Marks : 45

Time : 2 Hours

The figures in the margin indicate full marks for the questions.

1. Multiple choice questions : 1×5=5

   a) Which of the following is a linear data structure ?
   (i) Tree (ii) Array (iii) Graph (iv) Heap

   b) A single element of a linked list is known as a -
   (i) Node (ii) Index (iii) Root (iv) Queue

   c) Which data structure follows the LIFO principle ?
   (i) Queue (ii) Stack (iii) Array (iv) Tree

   d) The topmost node of a tree is called the -
   (i) Leaf (ii) Child (iii) Root (iv) Edge

   e) Binary search is generally performed on -
   (i) Sorted data (ii) Unsorted data
   (iii) Random data (iv) None of these

2. Answer the following questions (***any five***) : 2×5=10

   a) Define a data structure with one suitable example.

   b) State the meaning of an Abstract Data Type (ADT).

   c) Define a linked list.

   d) Name the two basic operations of a stack and state their purposes.

   e) Define a circular queue.

   f) State any two basic terminologies used in a binary tree.

   g) Define Big-O notation.

3. Answer the following questions (***any four***) : 5×4=20

a) Describe one-dimensional and two-dimensional arrays with suitable examples.

b) Define a singly linked list. Explain the insertion of a node at the beginning of the list.

c) Describe the push and pop operations of a stack with a simple example.

d) Explain preorder, inorder and postorder traversal of a binary tree.

e) Differentiate between linear search and binary search.

f) Write a C++ program to perform linear search on an array.

4. Answer the following questions (***any one***) : 10×1=10

a) Write a C++ program to insert a number at the beginning in a Link List. 10

b) Consider the following two-dimensional array A[3] [4] :

$$A = \begin{bmatrix} 10 & 20 & 30 & 40 \\ 50 & 60 & 70 & 80 \\ 90 & 100 & 110 & 120 \end{bmatrix}$$

Assume that the base address of A[0] [0] is 1000 and each element occupies 4 bytes.

(i) Find the memory address of A[2][1] using Row-Major Order.

(ii) Find the memory address of A[2][1] using Column-Major Order. 5+5

c) Explain Bubble Sort and write a C++ program to sort a list of numbers using Bubble Sort. 10

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