2021
COMPUTER SCIENCE
[HONOURS]
Paper : V

Full Marks : 50 Time : 2 Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

1. Answer any **two** questions from the following: 1×2=2

   a) What is the difference between array and linked list?

   b) What is inheritance?

   c) What is Hashing?

   d) How data hiding is ensured in C++?

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

   a) Compute the number of nodes in a full binary tree of height h.

   b) How binary trees are represented in memory?

   c) Why objects are called instance of a class?

   d) Differentiate between linear and non-linear data structures.

   e) Explain encapsulation and data abstraction in OOP.

   f) In which situations compiler invokes a copy constructor?

   g) Explain the differences between class and structure with suitable example.

   h) What do you understand by Divide and Conquer approach? Give an example.

3. Answer any **three** questions: 6×3=18

   a) Explain operator overloading and function overloading with proper example. 6

   b) Suppose a two-dimensional array A of size M×N is in memory. If the address of A[p][q]=B, find the address of A[i][j] considering each elements of the array can be stored in single memory word. Design a function/algorithm to implement binary search techniques using recursion. 3+3=6

c) Draw a strictly binary tree which is not a complete binary tree. Given the in-order and pre-order traversal for a binary tree as in_order={4, 2, 5, l, 3, 6} and pre_order={1, 2, 4, 5, 3, 6}, ?nd the post-order traversal while drawing the binary tree. l+5=6

d) Explain different forms of inheritance with suitable example. 6

e) Describe three popular hash functions with examples. 6

4. Answer any **two** from the following: 10×2=20

a) Write a function or algorithm to merge two sorted arrays into a single sorted array. Convert the array A={35, 26, 39, 56, 77, 42, 12, 20, 27, 36, 08} into a Binary Search Tree (BST). 5+5

b) Design a function or algorithm to sort a list of integers stored in a linear linked list. Describe various ?le opening modes in C++. Explain different access specifiers available in C++. 5+3+2

c) Find the time complexity of quick sort algorithm. Apply Quick sort algorithm

considering first element to be the pivot on an Array Al={5, 2, 3, 8, 7, 12, 2, l, l0, 4, 3}. 5+5

d) Write a C++ class to implement a stack using linear linked list. What is the difference between iteration and recurrence? 7+3

e) Write short notes on any **two**: 5×2=l0

i) Polymorphism

ii) Templates in C++

iii) Different ?le opening modes available in C++

iv) Radix Sort

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