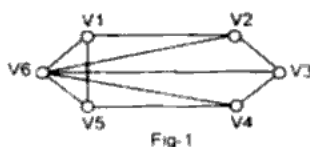


- (b) Define Hashing 2
- (c) Briefly explain the different commonly used hash functions 3
- (d) Explain different methods of collision resolution techniques 5
- 9 (a) The inorder and preorder traversal sequence of nodes in a binary tree are given below: 7
- Inorder : D G B A H E I C F
- Preorder : A B D G C E H I F
- Draw the binary tree. State briefly the logic used to construct the tree. Also draw its post-order Traversal.
- (b) Insert the following keys in the order given below to build them into an AVL tree. 5
- g, h, s, l, e, m, t, u
- Clearly mention different rotations used and balance factor of each node.
- (c) What is a threaded binary tree? 3
- 10.(a) Explain with a suitable example, the principal operation of Heap sort. 4
- (b) Find the time complexity of quick sort algorithm. 3
- (c) Represent the graph (fig-1) using 4
- (i) Adjacency Matrix
- (ii) Adjacency List
- (d) Starting from the vertex V1 show BFS and DFS traversal of the graph (Fig-1). 4



11. Write short notes on any three of the following: 3×5
- (a) Radix Sort
- (b) Index sequential File Organization
- (c) Tower of Hanoi Problem and Implementation
- (d) Merge sort

EC-504B

DATA STRUCTURE AND C

Time Allotted: 3 Hours

Full Marks: 70

The questions are of equal value
The figures in the margin indicate full marks.

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

GROUP A
(Multiple Choice Type Questions)

1. Answer any ten questions. 10×1 = 10
- (i) If h is any hashing function and is used to hash n keys into a table of size m , where $n \leq m$, the expected number of collisions involving a particular key x is
- (A) less than 1 (B) less than n
- (C) less than m (D) less than $n/2$
- (ii) You have to sort a list L consisting of a sorted list followed by a few "random" elements. Which of the following sorting methods would be especially suitable for such a task?
- (A) Bubble sort (B) Selection sort
- (C) Quick sort (D) Insertion sort
- (iii) The searching technique that takes $O(1)$ time to find a data is
- (A) Linear search (B) Binary search
- (C) Hashing (D) Tree search
- (iv) The postfix form of the expression $(A + B) * (C * D - E) * F / G$ is
- (A) $AB + CD * E - FG / **$ (B) $AB + CD * E - F ** G /$
- (C) $AB + CD * E - * F * G /$ (D) $AB + CDC * - * F * G /$

- (vi) A full binary tree with $2n + 1$ nodes contain
 (A) n leaf nodes (B) n non-leaf nodes
 (C) $n - 1$ leaf nodes (D) $n - 1$ non-leaf nodes
- (vii) A graph with n vertices will definitely have a parallel edge or self loop, if the total number of edges is
 (A) more than n (B) more than $n + 1$
 (C) more than $(n + 1) / 2$ (D) more than $n(n - 1) / 2$
- (viii) The minimum number of multiplications and additions required to evaluate the polynomial $P = 4x^3 + 3x^2 - 15x + 45$ is
 (A) 6 and 3 (B) 4 and 2 (C) 3 and 3 (D) 8 and 3
- (ix) The number of different directed trees with 3 nodes are
 (A) 2 (B) 3 (C) 4 (D) 5
- (x) A BST is traversed in the following order recursively: Right, root, left. The output sequence will be in
 (A) Ascending order (B) Descending order
 (C) Bitonic sequence (D) No specific order
- (xi) The pre-order and post order traversal of a Binary Tree generates the same output. The tree can have maximum
 (A) three nodes (B) two nodes
 (C) one node (D) any number of nodes
- (xii) If the address of $A[1][1]$ and $A[2][1]$ are 1000 and 1010 respectively and each element occupies 2 bytes then the array has been stored in _____ order.
 (A) row major (B) column major
 (C) matrix major (D) none of these
- (xiii) An adjacency matrix representation of a graph cannot contain information of:
 (A) nodes (B) edges
 (C) direction of edges (D) parallel edges

GROUP B
(Short Answer Type Questions)

Answer any *three* questions.

1. (a) Each element of an array $DATA[20][50]$ requires 4 bytes of storage. Base address of $DATA$ is 2000. Determine the location of $DATA[10][10]$ when the array is stored as (i) row major, (ii) column major. 3+5 = 15
- (b) What is sparse matrix? 4+1
2. (a) What are the advantages and disadvantages of Linked list over an array? 3+2
- (b) Define BIG-O, Ω , Θ notation. 2+3
3. (a) What is an Abstract Data Type? 5
- (b) Define the ADT for stack. 5
4. Write an algorithm for deletion of a node from a doubly-linked list. 5
5. Write a C language function to find the recursive function for in-order traversal. 5

GROUP C
(Long Answer Type Questions)

Answer any *three* questions.

6. (a) What is circular queue? 3+15 = 45
- (b) Write an algorithm to insert an item in circular queue. 2
- (c) What is priority queue? 5
- (d) Convert the following infix expressions into its equivalent postfix expressions: $A * (B + C) / D - E * F * (G / H)$ 3
7. (a) Show the stages in growth of an order-4 B-tree when the following keys are inserted in the order given : 5
 84, 82, 29, 99, 65, 12, 50, 28, 58, 71, 92, 75