2023

Time : 3 hours

Full Marks : 50

Pass Marks : 23

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

The figures in the margin indicate full marks.

Answer from all the Sections as directed.

Section – A

1. Choose the correct answer from given options : 1×5 = 5

(a) What is a dequeue ?

(i) A queue implemented with both singly and doubly linked lists

(ii) A queue with insert/delete defined for front side of the queue

(iii) A queue with insert/delete defined for both front and rear ends of the queue

(iv) A queue implemented with a doubly linked list

(b) Which of the following concepts make extensive use of arrays ?

(i) Binary trees

(ii) Scheduling of processes

(iii) Caching

(iv) Spatial locality

(c) Finding the location of a given item in a collection of items is called _____.

(i) Discovering

(ii) Finding

(iii) Mining

(iv) Searching

(d) Merge sort uses which of the following technique to implement sorting ?

(i) Backtracking

(ii) Greedy algorithm

(iii) Divide and conquer

(iv) Dynamic programming

(e) Given an array arr = {45, 77, 89, 90, 94, 99, 100} and key = 99 ; what are the mid values (corresponding array elements) in the first and second levels of recursion ?

(i) 90 and 99

(ii) 90 and 94

(iii) 89 and 99

(iv) 89 and 94

2. State True or False : $1 \times 5 = 5$

(a) Heap sort is stable sort. ✗

(b) Queue data structure is needed to convert infix notation to postfix notation. ✗

(c) Access of elements in linked list takes less time than compared to arrays. ✗

(d) B-tree data structures is a balanced binary tree. ✗

(e) The necessary condition to be checked before deletion from the Queue is overflow. ✗

Section – B

3. Answer any **four** questions of the following : 3×4 = 12

(a) Write a function to traverse single linear linked list in reverse order.

(b) Distinguish between Array and Linked list.

(c) Why do we need to do an algorithm analysis ? What are time complexity and space complexity ?

(d) Draw the binary tree using following sequences :

Inorder	Postorder
2	7
6	6
7	2
1	8
4	4
8	9
3	5
5	3
9	1

(e) Convert the following prefix and postfix expressions into infix expressions using stack data structure :

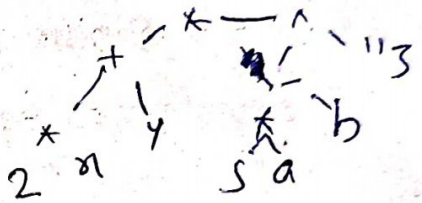
(i) E = ^ * – A + B C D + E F

(ii) E1 = A B C * D E F ^ / G * – H * +

(f) Draw the tree which corresponds to the expression

$E = (2x + y) * (5a - b)^3$

and find the preorder of the tree.



Section – C

4. Answer any four questions of the following : 7×4 = 28

(a) Write an algorithm to perform merge sort.

(b) Write algorithms to traverse a BST in preorder, postorder in inorder.

(c) Write a c program to perform enqueue and dequeue operations in a queue, using linked list.

(d) Describe applications of different types of data structure.

(e) Write functions :

(i) To insert node after a given node number in doubly linear linked list.

(ii) To delete the specified node in linear linked list.

(f) Explain the properties of AVL tree and Binary search tree.