Sem-V

2021

Time : 3 hours

Full Marks : 50

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 the given alternatives : 1×5 = 5

   (a) Which one of the following is an application of Stack Data Structure ?

   (i) Managing function calls

   (ii) Stock span problem

   (iii) Arithmetic expression evaluation

   (iv) None ot these

(b) Which of the following sorting algorithms can be used to sort a random linked list with minimum time complexity ?

(i) Insertion sort (ii) Quick sort

(iii) Heap sort (iv) Merge sort

(c) What will be the value of top, if the size of stack STACK_SIZE is 5 ?

(i) 5 (ii) 6

(iii) 4 (iv) 3

(d) Which of the following data structure store the homogeneous data elements ?

(i) Array (ii) Records

(iii) Pointers (iv) None of these

(e) Which of the following case does not exist in complexity theory ?

(i) Worst Case (ii) Average Case

(iii) Best Case (iv) Null Case

2. Fill in the blanks of the following: 1×5 = 5

(a) Each node in a linked list has two pairs of data and pointer.

(b) A binary search tree whose left subtree and right sub tree differ in height by at most 1 unit is called AVL Tree

(c) When new data are to be inserted into a data structure, but there is not available space; this situation is usually called _____.

(d) In _____, search start at the beginning of the list and check every element in the list.

(e) Two main measures for the efficiency of an algorithm are _____ and _____.

Group – B

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

3. Write infix equivalent of the prefix expression: + – * ^ A B C D//EF+GH and convert the obtained infix expresion to postfix expression.

4. How are the elements of a 2D array are stored in the memory ?

5. What are the advantages of Linked List over an array ?

6. Distinguish between Linear search and Binary search.

7. How the doubly linked list can be represented ?

8. Write a function to delete first node of circular linked list.

Goup – C

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

9. Construct an expression tree for the expression $(-b^2 + \sqrt{(b^2 - 4ac)})/2a$.

10. What are the various types of tree traversal ? Write an algorithm to perform preorder traversal in a tree.

11. Write an algorithm to perform quick sort.

12. Describe various applications of different types of data structures.

13. Write a C program to perform enqueue and dequeue operations in a queue using linked list. Also include the function to display the queue.

14. What is an AVL tree ? Insert the following integers in an initially empty AVL tree of integers: 1, 2, 3, 4, 6, 7, 8, 9, 10, 11, 5.