# DATA STRUCTURE USING C

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

## SECTION – A

Marks – 25

1. State true or false :  1 × 5 = 5

(i) Overflow will occur with linked list when AVAIL = NULL and there is an deletion.

(ii) Two elements of the same array cannot be of different data types.

(iii) Stack cannot be implemented using linked list.

(iv) Space complexity of an algorithm indicates its memory requirement.

(v) A graph may be represented using adjacency list.

[Turn over

2. Full up the blanks : $1 \times 5 = 5$

(i) Recursion uses _____ as an internal data structure.

(ii) In a _____ list, each node has two pointers.

(iii) A _____ queue does not follow FIFO rule strictly.

(iv) _____ refers to the notation in which the operator symbol is placed before its two operands.

(v) In D-queue insertion/deletion may be carried out at _____ .

3. Match words and phrases in column X with the nearest in meaning of words and phrases in column Y.

$1 \times 5 = 5$

| X | Y |
|---|---|
| (i) Leaf node | (a) A kind of binary tree |
| (ii) String | (b) Frequently used for maintaining polynon |
| (iii) Linear data structure | (c) All leaves are at the same level |

| X | Y |
|---|---|
| (iv) Degree of vertex | (d) Elements may be inserted or deleted only |
| (v) Header Linked list | (e) Number of edges incidents on the vertex |
| | (f) Static memory location |
| | (g) A finite sequence of zero or more character |
| | (h) Elements form a sequence |
| | (i) Zero children |

4. Choose the correct alternative : $1 \times 10 = 10$

(i) Which data structure is used in breadth first search of a graph to hold nodes ?

(a) Stack     (b) Queue

(c) Tree     (d) Array

(ii) In the _____ traversal we process all of a vertex's descendants before we move to an adjacent.

(a) Depth first     (b) Breadth first

(c) Width first     (d) Depth limited

(iii) In general, the binary search method needs no more than _____ comparisons.

    (a) $[log2n]-1$     (b) $[logn]+1$

    (c) $[log2n]$     (d) $[log2n]+1$

(iv) The property of binary tree is

    (a) The first subtree is called left subtree

    (b) The second subtree is called right subtree

    (c) The root cannot contain NULL

    (d) The right subtree can be empty

(v) Which of the following statement is false ?

    (a) Arrays are dense lists and static data structure

    (b) Data elements in linked list need not be stored in adjacent space in memory

    (c) Pointers store the next data element of a list

    (d) Linked lists are collection of the nodes that contain information part and next pointer

(vi) The way in which the data item or items are logically related defines

    (a) Storage structure

    (b) Data structure

    (c) Data relationship

    (d) Data operation

(vii) The average number comparisons done by sequential search is

    (a) $(N/2)+1$

    (b) $(N+1)/2$

    (c) $(N-1)/2$

    (d) $(N+2)/2$

(viii) Which one of the following is a Linear data structure that solve the

    (a) Lists

    (b) Linked List

    (c) Tree

    (d) Queues

(ix) Prefix notation is also known as

    (a) Reverse Polish Notation

    (b) Reverse Notation

    (c) Polish Reverse Notation

    (d) Polish Notation

(x) Quick Sort algorithm is an example of

    (a) Greedy approach

    (b) Dynamic Programming

    (c) Back tracking

    (d) Divide and conquer.

## SECTION – B

### Marks – 45

5. (a) Write the algorithm to sort a list of n elements using bubble sort.     5

    (b) Suppose P and T are strings with lengths R and S respectively and are stored as arrays with one character per element. Write an algorithm to find INDEX of P in T (Pattern matching algorithm).     5

6. (a) A binary tree T has 9 nodes. The inorder and preorder traversal of T yield the following sequence of nodes :     6

    Inorder :   E A C K F H D B G

    Preorder : F A E K C D H G B

    Draw the tree.

    (b) Suppose Q is an arithmetic expression written in infix notation. Write an algorithm to find the equivalent postfix expression P.     4

7. (a) Define linked List. Write an algorithm for inserting node at the beginning of a linked list.     5

    (b) Suppose the following list of letters is inserted in order into an empty binary search tree :     3+2=5

         J, R, D, G, T, E, M, H, P, A, F, Q

    (i) Find the final tree T

    (ii) Find the inorder traversal of T.

8. Write short notes on any *three* : 5×3=15

   (i) Quick Sort

   (ii) Binary Search

   (iii) Priority Queue

   (iv) Breadth First Serch

   (v) B-tree

   (vi) Recursion.