Total No. of printed pages = 7

Co-401/DSUC/4th Sem/2017/N

DATA STRUCTURE USING C

Full Marks – 70

Time – Three hours

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

PART – A

Marks – 25

Time – One hour

This part consists of 5 questions each carries 5 marks. All the questions are compulsory.

1. Choose the appropriate option : 1×5=5

   (i) A data structure is –

   (a) A file system

   (b) The mechanism for storing data permanently in hard disk

   (c) A mathematical or logical model of a particular organisation of data

   (d) None of the above

[Turn over

(ii) Complexity of an algorithm is –

(a) The logic behind a program

(b) The measurement of time and space taken by the execution of a program based on the algorithm

(c) The study of the data structure

(d) None of the above

(iii) A data structure may be –

(a) linear only

(b) hierarchical only

(c) either linear or nonlinear

(d) None of the above

(iv) A tree must have –

(a) The root

(b) The left sub-tree

(c) The right sub-tree

(d) Both left and right sub-tree

(v) Number of edges of a complete graph with n vertices is –

(a) n

(b) n(n−1)

(c) (n(n−1))/2

(d) n^2

2. Write down whether the following are true / false : 1×5=5

(i) Complexity of an algorithm is a time-space trade-off.

(ii) Push operation in a stack checks overflow condition of the stack.

(iii) A circular queue can overcome the problem of a linear queue.

(iv) An AVL tree is a binary tree.

(v) A hash table is a nonlinear data structure.

3. Answer the following in a single word/sentence : 1×5=5

(a) Which matrix has less number of nonzero elements than that of zero elements ?

(b) Between an array and a singly linked list. Which is better in utilization of space for the same amount and type of data ?

(c) What is a stack– a LIFO or a FIFO ?

(d) Key of any parent node of which binary tree is less than that of its right child.

(e) Name an algorithm used for generating minimum spanning tree.

4. Fill in the blanks : $1 \times 5 = 5$

(i) A matrix is a ——— data structure.

(ii) A graph is a ——— data structure.

(iii) Worst case complexity of bubble-sort algorithm in big O notation is ———.

(iv) Worst case complexity of binary search algorithm in big O notation is ———.

(v) ——— is one of the graph traversal algorithm.

5. Match Column A with Column B : 1×5=5

Column A	Column B
Substring	is used to represent a graph in memory
Doubly Linked List	related to string processing
Binary threaded tree	has a special pointer to link to higher nodes
Collision occurs	in a hash table
Matrix representation	is a dynamic data structure

PART – B

Marks – 45

Time – Two hours

This part consists of 7 questions each carries 9 marks equally. Out of 7 answering any 5 is compulsory.

1. Define the following with an example : 1½×6=9

   (i) Linear data structure

   (ii) Big O Notation

(iii) DEQUE

(iv) Binary Tree

(v) DiGraph

(vi) Hashing.

2. Differentiate between the following (any *three*) : 3×3=9

(i) Time complexity and space complexity of an algorithm

(ii) LIFO and FIFO

(iii) BFS and DFS

(iv) Prim's algorithm and Kruskal's algorithm.

3. Name any two applications of a stack. Convert the following infix arithmetic expression into postfix expression and evaluate it implementing postfix expression evaluation algorithm. 2+7=9

4. Define a doubly linked list. How many types of linked list are there ? Write functions in c to perform the following operation in a singly linked list. 1+2+3+3=9

(i) Insert an integer element at the begining of the list

(ii) Display the list.

5. Explain how a circular queue and a DEQUE overcome the drawbacks of a linear queue. 9

6. Build a binary search tree with following node values and write down the pre-order, in-order and post-order list from the built-in BST.

3+(2×3)=9

15, 27, 13, 9, 11, 20, 1, 5, 22, 35, 50

7. What will be the matrix representation and linked list representation of the following graph in memory. 4+5=9