M.Sc. 1st Semester Examination, 2019

COMPUTER SCIENCE

(Data Structure and Algorithm)

PAPER – COS-101

Full Marks : 50

Time : 2 hours

Answer **all** questions

The figures in the right hand margin indicate marks

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

Illustrate the answers wherever necessary

1. Answer any *four* questions : 2 × 4

(*a*) Write the best case time complexity of insertion sort.

(*b*) Why binary search can not be used the linked list ?

(*c*) Compare and contrast array and linked list.

(*d*) Write the advantages of doubly linked list.

(*e*) What is an abstract data type ?

(*f*) Compare stack and queue.

(*g*) What do you mean by dynamic allocation of memory ?

(*h*) What is a self-referential structure ?

2. Answer any *four* questions : 4 × 4

(*a*) Write a C language function to delete the *n*th node of a single linked list.

(*b*) Convert the following infix expression to postfix notation by showing the operator stack and output string after reading each input taken.

$$(A * B) * C - (D - E)/(F + G).$$

(*c*) Explain with suitable example the principle of operation of quick sort.

(*d*) Write an algorithm to search a node in a binary search tree.

(*e*) The order of nodes of a binary tree in pre-order and in-order traversal are as under :

In-order : D B F E G H I A C

Pre-order : A B D E F G H I C

Draw the corresponding binary tree.

(*f*) What is queue ? Write Q-insert algorithm for the circular queue.

(*g*) Show how the following integers can be inserted in an empty binary search tree in the order they can given :

50, 30, 10, 90, 100, 40, 60, 20, 110, 5

Draw the tree in each step.

(*h*) Explain three uses of stack data structure.

3. Answer any *two* questions : 8×2

(*a*) Write the algorithm of selection sort and calculate the complexity for best, worst and average cases.

(*b*) (*i*) How does static allocation differ from dynamic allocation of memory ?

(*ii*) How a polynomial such as

$$6x^6 + 4x^3 - 2x + 10$$

can be represented by a linked list ?

(*c*) (*i*) Why is queue data structure called FIFO ?

(*ii*) Write the algorithm to reverse linked list.

(*d*) Write short notes on the following (any *two*) :

(*i*) Big O notation

(*ii*) Priority queue

(*iii*) B-tree

(*iv*) Iteration *Vs* Recursion.