2018

M.Sc. 1st Seme. Examination

COMPUTER SCIENCE

PAPER—COS-101

Full Marks : 50

Time : 2 Hours

The figures in the margin indicate full marks.

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

Illustrate the answers wherever necessary.

Data Structure and Algorithm

1. Answer any *four* questions : 4×2

   (a) Discuss the advantages of doubly linked list as compared to single linked list.

   (b) How polynomials can be represented using linked list ?

   (c) Compare and contrast Array & Linked List.

(d) Explain ADT (Abstract Data Type).

(e) What is recursion ? Give example.

(f) What is the precondition of performing binary search in an array ?

(g) Write the best case time complexity of Bubble sort technique.

(h) Which of the following is the best time for an algorithm ?
(a) O(n) (b) $O(\log_2 n)$ (c) $O(2^n)$ (d) $O(n \log_2 n)$.

2. Answer any *four* questions : 4×4

(a) What is queue ? Write Q-insert algorithm for the circular queue. 1+3

(b) Construct the expression tree for the following expression :

$$E = (2a + 5b)(x - 7y).$$

(c) Write the recursive function for the problem of Tower of Hanoi problem.

(d) Write a C function for selection sort and also calculate the time complexity for selection sort. 3+1

(e) Write a C function for popping an element from a stack implemented using linked list.

(f) Compare the performance and operation of Bubble Sort and Selection Sort.

(g) How does static allocation differ from dynamic allocation of memory ?

(h) What do you mean by a B-Tree and what are the uses of such a tree in data structures ? 2+2

3. Answer any *two* questions : 2×8

(a) (i) Given the preorder and inorder sequence and draw the resultant binary tree :

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

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

(ii) Write algorithm for inorder traversal of a binary tree. 5+3

(b) (i) Write the advantage of circular queue over linear queue.

(ii) *What is a self* referential structure ?

(iii) Describe a string reversal algorithm.

(iv) Write the difference between a[ ] [ ] and a.

3+1+3+1

(c) (i) Construct an AVL tree using the below list. Show all the steps 12, 11, 13, 10, 09, 15, 14, 18, 7, 6, 5, 4, 5.

(ii) Find the postfix notation of

(a + b * x) \ (a ! – d) s – c * y (show all steps).

5+3

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

(i) Abstract Data type

(ii) Big-O notation

(iii) BTree

(iv) Tail recursion

(v) Merge Sort. 4+4

Internal Assessment — 10