Bachelor of Science (B.Sc.) Semester—III Examination

COMPUTER SCIENCE (DATA STRUCTURES)

Optional Paper—I

Time : Three Hours] [Maximum Marks : 50

N.B. :— (1) **ALL** questions are compulsory and carry equal marks.

(2) Draw neat and well labelled diagram wherever necessary.

EITHER

1. (A) What is linked list ? Explain its memory representation. 5

(B) Write an algorithm to delete the first node from linked list. 5

OR

(C) Write an algorithm to insert a node at the end of single linked list. 5

(D) Explain the linked list representation of polynomial with suitable example. 5

EITHER

2. (A) Write an algorithm for PUSH and POP in the stack. 5

(B) Convert the following infix expressions into prefix and postfix :

(i) A + ((B $\wedge$ C) – D) * (E – (A | C))

(ii) A + (B $\wedge$ D) | (E – F) + G. 5

OR

(C) Explain Tower of Hanoi problem with suitable example. 5

(D) Let N be integer and suppose H(N) is recursively defined by :

$$H(N) = \begin{cases} 3*N & \text{if } N<5 \\ 2*H(N-5)+7 & \text{if } N>=5 \end{cases}$$

Find :

(i) H(8)

(ii) H(24). 5

EITHER

3. (A) What is priority queue ? Explain array representation of priority queue. 5

(B) Explain selection sort techniques with suitable example. 5

OR

(C) What is circular queue ? Write an algorithm to insert an element in circular queue. 5

(D) Write an algorithm for insertion sort method. 5

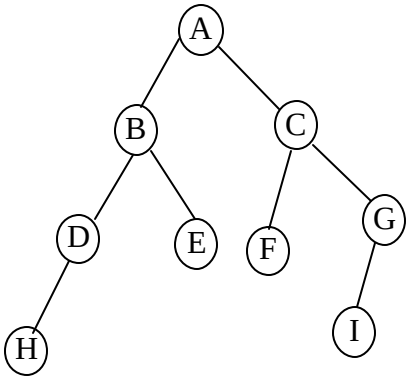
EITHER

4. (A) What is binary search tree ? Explain with suitable example. 5

(B) Explain Breadth first search algorithm to traverse a graph. 5

OR

(C) Write inorder, preorder and postorder traversal of the following binary tree T :



5

(D) Explain with suitable example, how graphs are represented in memory using linked list. 5

5. (A) Explain circular double linked list. 2½

(B) Evaluate the following arithmetic expression P written in postfix notation by using stack :

10, 12, 4, +, *, 24, 8, 1, – 2½

(C) What is hash function ? Explain any one hashing technique with example. 2½

(D) Define complete binary tree. 2½