3 (Sem–3/CBCS) CSC HC 1

2022

COMPUTER SCIENCE

(Honours)

Paper : CSC–HC–3016

(Data Structures)

Full Marks : 60

Time : Three hours

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

1. Answer the following as directed : ***(any seven)*** 1×7=7

   (i) If the elements 'A', 'B', 'C' and 'D' are placed in a queue and are deleted one at a time, in what order will they be removed ?

   (a) ABCD

   (b) DCBA

   (c) DCAB

   (d) ABDC

   (Choose the correct option)

(ii) In a circular linked list

(a) components are arranged hierarchically

(b) there is no beginning and no end

(c) Both (a) and (b)

(d) None of the above

(Choose the correct option)

(iii) _____ is a LIFO data structure.

(Fill in the blank)

(iv) In a doubly linked list, each node store the address of previous and next node.

*(State True **or** False)*

(v) Maximum number of nodes in a binary tree with height h is _____.

(Fill in the blank)

(vi) _____ data structure is used for traversing a binary tree in level order fashion.

(Fill in the blank)

(vii) Duplicate elements are not allowed in binary search tree.

*(State True **or** False)*

(viii) A _____ binary tree can be efficiently represented using an array.

(Fill in the blank)

(ix) Worst case complexity of selection sort is _____. *(Fill in the blank)*

(x) _____ sorting algorithm uses divide and conquer policy. *(Fill in the blank)*

(xi) _____ is a collision resolution strategy in hashing. *(Fill in the blank)*

(xii) Complexity of binary search algorithm is _____. *(Fill in the blank)*

2. Define the following terms : ***(any four)*** 2×4=8

(a) Binary Search Tree

(b) De queue

(c) Multi-Dimensional Array

(d) Stack

(e) Height balance tree

(f) Skiplist

Contd.

(g) Sparse matrix

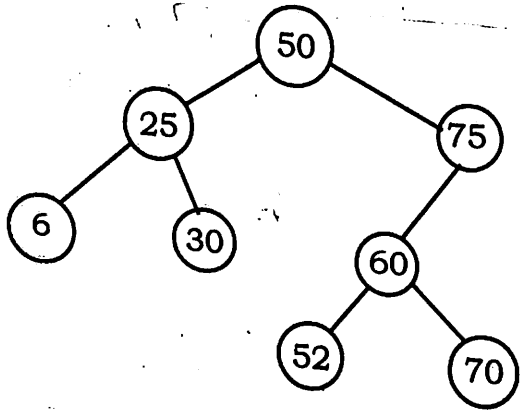
(h) Hash function

3. Answer ***any three*** questions from the following : 5×3=15

(a) Differentiate linear search and binary search technique.

(b) Draw a binary search tree with the following list of elements :
18, 8, 6, 2, 7, 9, 10, 16, 15, 19, 17, 20

(c) A binary search tree is given as follows :



Now, draw the binary search tree after deleting the element 60. Also find the inorder traversal of the above binary search tree given.

(d) Evaluate the following postfix expression using stack :
7 4 −3 * 1 5 + / *

(e) Explain the advantages and limitations of recursion with the help of example.

(f) Explain how to choose a Hash function with the help of an example.

(g) Write an algorithm for insertion sort technique.

(h) Construct the binary tree from given inorder and preorder traversal as follows :
Inorder : D, B, E, A, F, C

Preorder : A, B, D, E, C, F

4. Answer ***any three*** questions from the following : 10×3=30

(a) Write a program to implement a stack using array.

(b) Sort the following elements using bubble sort (show the steps) :

5, 7, 1, 0, 2, 3

(c) Discuss the advantages of linked list over array with the help of example. Write algorithm to reverse a linked list.

(d) Write the algorithm for deleting a node from binary search tree.

(e) Write non-recursive algorithms to traverse a binary tree in inorder and preorder.

(f) Write algorithm/program to implement merge sort. Analyse the complexity of the algorithm.

(g) Write a program to implement a singly linked list for inserting an element at the end of the list, deleting an element from the beginning of the list.

(h) Write an algorithm to convert infix expression to postfix.
