Total number of printed pages:4

UG/3rd/UCSE306

2021

DATA STRUCTURE USING C

Full Marks: 100

Time: Three hours

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

*Answer **any five** questions.*

1. A) *Fill up the blanks with an appropriate word:* 1*5=5

a) The worst case time complexity of searching an element in a linked list is ----------.

b) The best case time complexity is denoted by ---------- notation.

c) The best case time complexity of insertion sort is---------.

d) Stack is known as a ----------data structure.

e) The worst case time complexity of quick sort is---------.

B) *State true or false:* 1*5=5

a) A tree forms a cycle.

b) Time complexity is one of the parameters which can determine whether an algorithm is more efficient than another one.

c) Link list is an efficient way for storing data than an array.

d) Depth first search utilizes queue data structure during graph traversal.

e) A queue is a nonlinear data structure.

C) *Define the following terms in brief:* 2*5=10

a) Graph

b) Binary search tree

c) Balanced factor

d) Breadth first search

e) AVL tree

2. a) Why worst case time complexity of selection sort for sorting n elements is $O(n^2)$? Explain. 6

b) Write the intermediate steps for selection sort while sorting the following data: 60 40 50 30 80 70 20 55 25 7

c) Write an algorithm for a queue to perform its operations circularly. 7

3 a) Write the intermediate steps of quick sort while sorting the following data: 60 30 20 40 15 18 45 65 70 8

b) Write an algorithm for binary search technique. 6

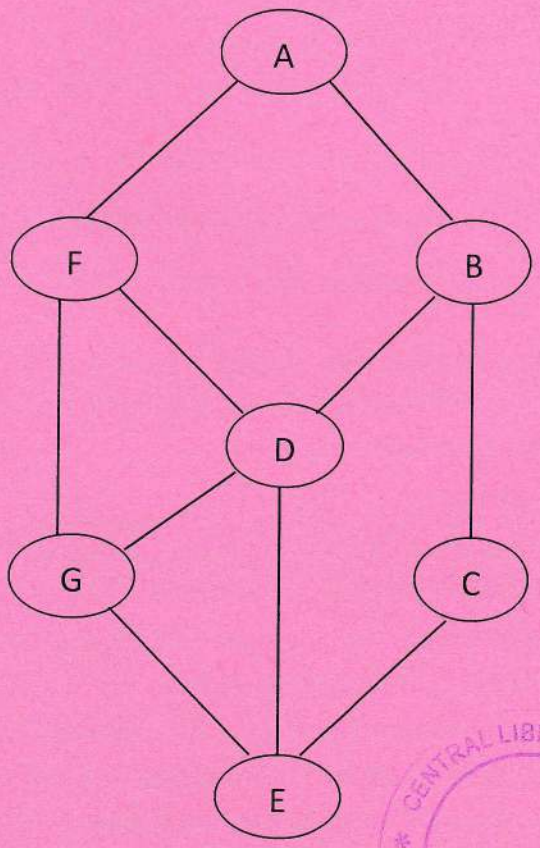
c) Why time complexity of binary search is O(log n)? 6

4 a) Write the algorithmic steps for bubble sort method. 7

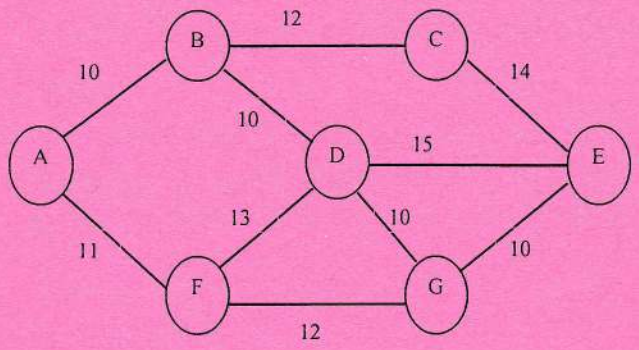
b) Apply bubble sort on the following data to find the intermediate steps: 6

55 35 25 15 75 40 30 20 10

c) Apply breadth first search traversal to the following graph showing the status of the queue for each step: 7



5. a) What is minimum spanning tree? Find the minimum spanning tree of the following graph: 2+5=7



b) Build a binary search tree from the following data: 5

60 55 35 25 15 75 40 30
20 10

c) Draw a binary tree from the following given pre-order and in-order traversals: 8

Pre order: a b d e c f g

In order: d b e a f c g

6. a) What is linked list? How a singly linked list is different from a doubly linked list? 2+2=4

b) Write an algorithm to insert an element in the last position of a singly linked list. 5

c) Write an algorithm to insert an element between the first and the last position of a singly linked list. 6

d) Write an algorithm to delete an element from the beginning of a singly linked list. 5