University of Sargodha

BS 3rd Term Examination 2023

Subject: Information Technology **Paper: Data Structure & Algorithms (CMPC-203)**

Time Allowed: 02:30 Hours **Maximum Marks: 40**

Note: Objective part is compulsory. Attempt any three questions from subjective part.

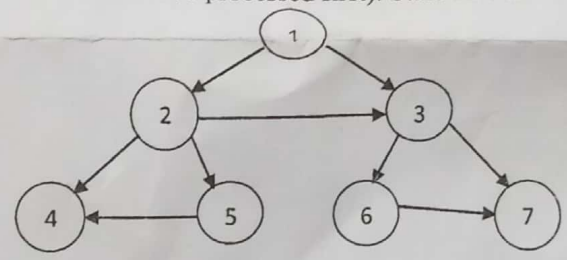
Objective Part (Compulsory)

Q.1. Write short answers of the following in 2-3 lines each on your answer sheet. (2*8)

i. By using java syntax, define the structure of a node of a queue.
ii. How many references are normally used to maintain a circular queue data structure?
iii. What is prefix of A+B * C?
iv. Which of the following is a linear or a non-linear data structure? Doubly linked list, Graph.
v. What is POSTFIX of A $ B $ C, where $ is exponentiation operator?
vi. Write the name of technique to combine two sorted lists into a single sorted list.
vii. What is the total number of nodes in a strictly binary tree having five number of leaves?
viii. What is the associativity of exponentiation operator?

Subjective Part

Q.2. Traverse the following graph using DFS and BFS algorithms in ascending numeric order (that is a node with smaller numeric number should be processed first). Start with node A. [4+4]



Q.3. Write down a function that accepts two sorted arrays as parameters and combines these arrays into third array (which is initially empty) in sorted order. The combined array is displayed by main().
Note: there is no need to create a class. Only write down the relevant function and a few statements that call this function in main(). [8]

Q.4. a) Draw a binary search tree by inserting the following numbers from left to right. [6]

14, 5, 7, 1, 6, 10, 11, 17, 19, 18

Also write the pre-order, in-order and post-order traversal of the above tree created.

i) Pre order traversal ii) In-order traversal iii) Post order traversal.

b) The in-order traversal of binary tree is d, b, e, a, f, c, g [2]
Pre-order traversal of binary tree is a, b, d, e, c, f, g. Write down the post-order traversal of binary tree.

Q.5. a) Write down the function for binary searching an element from an array recursively. [4]
b) Write down a function that accepts reference of the first node as a parameter and returns total count in the singly linked list. [4]

Q.6. a) Convert the following infix expression to postfix expression using stack. The symbol $ is used for exponentiation operator. [6]

A + (((B – C) *(D - E) + F) / G) $ (H - J)

b) Write down a function to add all elements of the array recursively. [2]

---------- LK-6446/15-06-23 ----------