CS201-CS218: Data Structures Mock Final Exam, Spring 2020

Time: 12:00 - 1:00 pm (1 Hour)

Date: 12th of June, 2020

Weightage: 5%

Course Instructors: Dr. Abdul Waheed (abdul.waheedkhan@nu.edu.pk), Mr. Shehreyar Rashid (shehreyar.rashid@nu.edu.pk)

Division of 1 Hour: Around 40 min for attempt and the rest for submission on Google Classroom and through email.

How to attempt: Handwritten solution to be scanned. Furthermore, adhere to the following Instructions:

1. Mock Final exam is placed on Google Classroom and also emailed to your nu.edu.pk email address. It should be submitted via Google Classroom and email.
2. The **subject of your email** and **name of your pdf file** must be as follows. **Otherwise, it will not be considered as a submission**.

   CS201-CS218_Mock_Section_A_i18xxxx

   Where 'A' is your section. i18 is your batch. Replace 'xxxx', 'A', and 18 with your correct details.
3. Upload your pdf file on Google Classroom and Email to your course Teacher. Email must be from your nu.edu.pk email address.
4. The standard remote mock final exam will be attempted offline in your own handwriting.
5. You must use A4 size blank white sheets to attempt the exam (portrait format unless a diagram or table requires landscape). Each sheet of the A4 size paper MUST have the **Roll Number**, **Name**, **the course code**, **name of the course** and **signature** of the student on top.
6. You can use cam-scanner, MS lens or an equivalent application to scan and convert your hand-written answer sheets into a SINGLE pdf file (keeping the correct order of pages and question numbers), which you will submit on Google Classroom, and MUST also, email to your concerned course teacher. You will be given 15 minutes for this purpose. The time to attempt is 40 minutes. Altogether, you have 1 hour.
7. Plagiarism of any type will result in zero marks in the mock final exam and may result in F grade in the course. Instructors may conduct vivas of randomly selected students or in case of doubt (significantly different attempt as compared to past performance in the course). Plagiarism includes sharing an attempt with other students (copy provider). Students who are not able to satisfactorily answer instructor's questions (based on the exam as well as slightly lateral but related concepts) during viva will also be considered as a plagiarism case.

[Total Marks: 50]

1. Draw a Tree whose Infix, Prefix and Postfix are given as follows: [Marks: 30]

   a) Inorder traversal of binary tree is
      C – E – B – A – D – F – G

   b) Preorder traversal of binary tree is
      A – B – E – C – D – F – G

   c) Postorder traversal of binary tree is
      C – E – B – G – F – D – A

2. A student has been asked to write C++ code that deletes a node in BST. Student is very honest and has decided not to take help from lecture slides and has written the code given as follows:

```
void makeDeletion(node*& nodePtr)
{
    node* tempNodePtr;
    if (nodePtr->right == NULL)
    {
           tempNodePtr = nodePtr;
           nodePtr = nodePtr->left;
           delete tempNodePtr;
    }
    else if (nodePtr->left == NULL)
    {
           tempNodePtr = nodePtr;
           nodePtr = nodePtr->right;
           delete tempNodePtr;
    }
    else
    {
           tempNodePtr = nodePtr->left;
           while (tempNodePtr->right)
           {
                  tempNodePtr = tempNodePtr->right;
           }
           nodePtr->value = tempNodePtr->value;
           deleteNode(tempNodePtr->key, nodePtr->left);
    }
}
void deleteNode(int num, node*& nodePtr)
{
    if (nodePtr == NULL)
           cout << num << " not found.\n";
    else if (num < nodePtr->value)
           deleteNode(num, nodePtr->left);
    else if (num > nodePtr->value)
           deleteNode(num, nodePtr->right);
    else
           makeDeletion(nodePtr);
}
```

You can assume structure of tree node as follows:

```
struct node
{
	int value;
	node* left, * right;
};
```

And there is **NO SYNTAX ERROR**

Based on the code given, answer the following question:

Is this code working correctly for **Two Child Case**? If yes, explain the logic (**do not explain the code line by line, just logic**). If code is not working correctly, identify the logical problem and correct the code (**you are not allowed to copy & paste code given in slides).** Remember yes/no will not get you marks. You have to explain in **max two or three lines**. [Marks:20]