

CS 201 Data Structures

Monday September 26, 2016

Course Instructors

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Serial No:

Sessional-01 Exam

Total Time:01 Hour

Total Marks: 40

Signature of Invigilator

Roll No

Section

Name

Signature

DO NOT OPEN THE QUESTION BOOK OR START UNTIL INSTRUCTED.

Instructions:

1. Verify at the start of the exam that you have a total of **five (05)** questions printed on **Seven (07)** pages including this title page.
2. The exam is closed books, closed notes. Please see that the area in your threshold is free of any material classified as 'useful in the paper' or else there may a charge of cheating.
3. Read the questions carefully for clarity of context and understanding of meaning and make assumptions wherever required, for neither the invigilator will address your queries, nor the teacher/examiner will come to the examination hall for any assistance.
4. Use only your own stationery and calculator. If you do not have your own calculator, use manual calculations.
5. Use only permanent ink-pens. Only the questions attempted with permanent ink-pens will be considered. Any part of paper done in lead pencil cannot be claimed for checking/rechecking.

	Q-1	Q-2	Q-3	Q-4	Q-5	Total
Total Marks	12	09	06	06	07	40
Marks Obtained						

Vetted By: _____ Vetter Signature: _____

Question 01 (12 marks)

Answer the questions given below on the basis of following scenario:

Samsung is a South Korean multinational company headquartered in Samsung Town, Seoul. Samsung (Company) manufactures multiple electronics' products and has presence worldwide including Pakistan through company's sales outlets. Suppose company is selling/distributing its three products (Mobiles, LEDs, and Refrigerators) with two company-owned outlets in each of the five major cities i.e. Karachi, Lahore, Peshawar, Quetta, and Islamabad. Furthermore, they are just interested to store/keep record of the quantities of their products sold through each of their outlet.

- A. Suppose you are tasked to store company's sales in a 3-D array. Identify/enlist the dimensions and declare a 3-D array. (2 marks)
- B. What would be the formula for address translation to locate a particular element in the above-declared 3-D array? You may test/try to compute a specific index position using your suggested formula☺. (2 marks)
- C. The company (Samsung) wants to award (give bonus) to their top three outlets on the basis of maximum sales and also to identify the outlet having average (approx.) sales volume. Propose solutions to solve these two problems. Clearly mention the name of techniques (if already well known) otherwise suggest your ones☺. Also, write pseudo-code for each of the proposed solution/technique. (5+3 = 8 marks)

Question 02 (09 Marks)

Write a **C++ function** that takes a linked list and two integers X and Y as input. Function will modify the linked list such that it keeps X number of nodes then deletes next Y number of nodes. This process will continue until end of the linked list. Your code should cater for any boundary conditions.

Input:

X=2, Y=3

Linked List: 1->2->3->4->5->6->7->8->9->10->11

Output:

Linked List: 1->2->6->7->11

Question 03 (06 Marks)

Consider pointer based implementation of queue class, write a member function (pseudo-code) reverseQueue that reverses a queue.

Note: You are not allowed to use arrays and recursion.

Question 04 (06 Marks)

Find the position of a given value in the linked list from end, i.e. if the list is as follows:

1->2->3->4->5-||

In this list, position of Value "4" is 2. Your function should return 2.

You are required to write **pseudo-code** of recursive, class member function(s) of linked list class already discussed during lectures. There are no extra points for re-writing the complete linked list class.

Question 05 (07 Marks)

Write a recursive **C++ function** with the following prototype that returns the sum of the digits of an integer.

If x is 234, the function should return $2 + 3 + 4$, that is, 9.

If x is 12, the function should return $1 + 2$, which is 3.

If x is 39, the function should return 12.

```
int sumOfDigits(int x);  
{
```

```
}
```