# Department of Computing

**CS213: Advanced Programming**

**Class: BSCS – 3AB & BESE 4A**

# Lab 8: Change-Making Problem

**Date: April 11th, 2016 / April 15th, 2016**

**Time: Friday (10:00 AM – 01:00 PM & 02:00 PM - 05:00 PM) / Monday (02:00PM – 05:00PM)**

# Instructor: Fahad Ahmed Satti

# Lab 7: Change-Making Problem

**Introduction**

In this lab, students will design solution for Change-Making problem by using Greedy algorithm and Dynamic Programming. Given a large number of 1, 5, 10 and 25 coins denominations, goal is to choose fewest coins totaling N, where N is the amount of money to be changed.

**Objectives**

After performing this lab students will be able to understand:

* Dynamic Programming
* Optimal Solution selection
* Optimization

**Tools/Software Requirement**

* Preferred Programming Language: Java
* Any IDE
* SVN – Github

**Description**

The change-making problem addresses the following question: how can a given amount of money be made with the least number of coins of given denominations? In simple words, it is the problem of representing a given value with the fewest coins possible. It is a knapsack type problem, and has applications wider than just currency. An application of change-making problem can be found in computing the ways one can make a nine dart finish in a game of darts.

You are more than welcome to search on the WWW to look for more resources and help.

**Lab Task**

Your task will be to implement the following:

1. Design the solution of Change-Making problem by using Greedy algorithm and Dynamic Programming. The coin denominations are 1, 5, 10 and 25.
2. Find 10 numbers for which Dynamic programming solution is optimal.
3. Create detailed documentation for the application.
4. Unit tests to evaluate your code.
5. Using a Version Control System (VCS) to manage your solutions.

**Deliverables**

Following the guidelines set out in your course outline, your submission must include the following:

1. Unit tests
2. Comments in your code
3. A description document with separate sections on Introduction, Your Approaches, How to run your application, Detailed description, Link to public GitHub repo with your submission and any supplementary data.
4. Original Source Code

Convert your submission files to a zip folder and name it as given below and upload the zip folder on LMS.

Name – Registration No. – Section

**Grade Criteria**

This lab is graded. Min marks: 0. Max marks: 10.

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| **Activity** | **Minimum** | **Maximum** |
| Documentation with clearly defined understanding of the lab task and approach | Fail | Pass |
| Code clarity | 0 | 1 |
| Github (SVN) | 0 | 1 |
| Unit Tests | 0 | 1 |
| Viva | 0 | 3 |
| Lab Task | 0 | 4 |