Faculty of Engineering and Technology			
Ramaiah University of Applied Sciences			
Department	Computer Science and Engineering	Programme	B. Tech.
Semester/Batch	4th /2017		
Course Code	CSC209A	Course Title	Design and Analysis of Algorithms
Course Leader	Vaishali R. Kulkarni and Pallavi R Kumar		

Assignment-1

Reg.No.		Name of Student	

Sections		Marking Scheme	Marks		
			Max Marks	First Examiner Marks	Moderator
Part A					
	A.1.1	Introduction	01		
	A.1.2	Advantages and drawbacks of randomized algorithm	03		
	A.1.3	Conclusion	01		
		Part-A Max Marks	05		
Part B.1					
	B.1.1	Brute Force algorithm for finding LCS	02		
	B.1.2	Dynamic programming-based algorithm for finding LCS	04		
	B.1.3	Comparison of dynamic programming and Brute Force Algorithms	02		
	B.1.4	Conclusion	02		
		B.1 Max Marks	10		
Part B.2					
	B.2.1	A naïve algorithm for the solution	02		
	B.2.2	A divide and conquer-based algorithm	03		
	B.2.3	Analysis of time and space complexity for each algorithm	03		
	B.2.4	Conclusion	02		
		B.2 Max Marks	10		
Total Assignment Marks			25		

Course Marks Tabulation				
Component-1 (B) Assignment	**First Examiner**	**Remarks**	**Moderator**	**Remarks**
A				
B.1				
B.2				
Marks (Max 50)				
Marks (out of 25)				
Signature of First Examiner			**Signature of Moderator**	

Please note:

1. Documental evidence for all the components/parts of the assessment such as the reports, photographs, laboratory exam / tool tests are required to be attached to the assignment report in a proper order.
2. The First Examiner is required to mark the comments in RED ink and the Second Examiner's comments should be in GREEN ink.
3. The marks for all the questions of the assignment have to be written only in the **Component – CET B: Assignment** table.
4. If the variation between the marks awarded by the first examiner and the second examiner lies within +/- 3 marks, then the marks allotted by the first examiner is considered to be final. If the variation is more than +/- 3 marks then both the examiners should resolve the issue in consultation with the Chairman BoE.

RAMAIAH UNIVERSITY OF APPLIED SCIENCES

Assignment 1

Term - 1

Instructions to students:

1. The assignment consists of **3** questions: Part A-**1** Question, Part B-**2** Questions.
2. Maximum marks is 2**5**.
3. The assignment has to be neatly word processed as per the prescribed format.
4. The maximum number of pages should be restricted to **10**.
5. Restrict your report for Part-A to 3 pages only.
6. Restrict your report for Part-B to a maximum of 7 pages.
7. The printed assignment must be submitted to the course leader.
8. **Submission Date: 18th Feb 2019**
9. **Submission after the due date is not permitted.**
10. **IMPORTANT**: It is essential that all the sources used in preparation of the assignment must be suitably referenced in the text.
11. Marks will be awarded only to the sections and subsections clearly indicated as per the problem statement/exercise/question

Preamble

This course is intended to teach the principles and concepts of design and analysis of computer algorithms. Formal proofs of algorithms and techniques for analyzing their best case, worst case, average case & amortized complexities are covered. Brute force, greedy, divide-and-conquer, branch-and-bound, backtracking and dynamic programming based algorithm design techniques are covered in detail and illustrated using examples. Complexity classes, approximations, heuristics and randomized algorithm techniques are discussed. Students are trained to design and analyze algorithms for the given computational problems using appropriate techniques and methods. This assignment is designed to test the ability of students to select an appropriate algorithm with suitable data structures, develop applications using them, analyze them and generate an analytical report.

Part A **(10 marks)**

Analysis of algorithms includes performance using time and space complexity. A randomized algorithm employs a degree of randomness as part of its logic. The algorithm typically uses uniformly distributed random bits as an auxiliary input to guide its behavior, in the hope of achieving good performance in the "average case" over all possible choices of random bits.

In this context, write an essay on the topic "***Randomness is used to reduce time complexity or space complexity in standard algorithms***." The essay should emphasize on:

A.1.1 Introduction

A.1.2 Advantages and drawbacks of randomized algorithm

A.1.3 Conclusion

Part B **(20 Marks)**

(ILO-6)

B.1 **(10 Marks)**

Given two strings: string X of length $m[X(1..m)]$, and string Y of length $n\,[Y(1..n)]$, find the longest common subsequence (LCA) of characters that appear left-to-right (but not necessarily in a contiguous block) in both strings. For example, if X = "ABCBDAB" and Y = "BDCABA", the LCS(X, Y) = {"BCBA", "BDAB", "BCAB"}. The report should include the following:

B.1.1 Brute Force algorithm for finding LCS

B.1.2 Dynamic programming-based algorithm for finding LCS

B.1.3 Comparison of dynamic programming and Brute Force algorithms

B.1.4 Conclusion

B.2 **(10 Marks)**

Consider two strings that represent a student's registration number in binary format. Convert the registration number from string to integer type and determine the product of the two string representations, in equivalent decimal representation. For example, if the first bit string is "1100" and second bit string is "1010", output should be 120. Let the length of two strings be same and equal to $\boldsymbol{n}$. The report should include the following:

B.2.1 A naïve algorithm for the solution

B.2.2 A divide and conquer-based algorithm

B.2.3 Analysis of time and space complexity of each one of the two algorithms

B.2.4 Conclusion