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-2			
Reg.No.		Name of Student	

Sections		Marking Scheme		Max Marks	First Examiner Marks	Moderator
Part A	A.1.1	Introduction to amortized analysis		01		
	A.1.2	Example		03		
	A.1.3	Conclusion		01		
			Part-A Max Marks	05		
Part B.1	B.1.1	Algorithm		04		
	B.1.2	A C program		04		
	B.1.3	Analysis of time and space complexity		02		
			B.1 Max Marks	10		
Part B.2	B.2.1	Description of suitable data structure		02		
	B.2.2	Algorithm		04		
	B.2.3	C program		04		
			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 (out of 25)				

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.

Assignment 2

Term - 2

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 March 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 dealt 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)

Amortized analysis is used for analyzing a given algorithm's complexity in terms of the resources, especially time or memory. While certain operations for a given algorithm may have a significant cost in resources, other operations may not be as costly. Amortized analysis considers both the costly and less costly operations together over the whole series of operations of the algorithm. This may include accounting for different types of input, length of the input, and other factors that affect the performance of an algorithm.

In this context, write an essay on the topic:
"**Pessimistic approach in amortized analysis**".
The essay should emphasize on:

    A.1.1 Introduction to amortized analysis
    A.1.2 Example illustrating amortized analysis
    A.1.3 Conclusion

Part B (20 Marks)

B.1 (10 Marks)

    There are n computers connected by m cables. Some of the cables are damaged and requires repair to connect computers again. There is a fixed cost to repair a particular cable. Determine the minimum cost to reconnect all the computers by repairing cabling. The report should include the following:

    B.1.1 Algorithm
    B.1.2 A C program
    B.1.3 Analysis of time and space complexity

B.2 (10 Marks)

    Consider a data structure "QUACK" combining the properties of both stacks and queues. QUACK can be viewed as a list of elements written from left to right such that the following three operations are possible:

- PUSH to add a new item to the left end of the list
- POP to remove the item on the left end of the list
- PULL to remove an item on the right end of the list

The report should include the following:

    B.2.1 Design of the data structure QUACK
    B.2.2 Algorithms for operations on stack and queue
    B.2.3 C functions for stack and queue operations