CSE- 5162 PROGRAMMING LAB

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LAB MANUAL

I Sem M.Tech (CSE AND CSIS)

(2019)

DEPT OF COMPUTER SCIENCE & ENGG.

M. I. T., MANIPAL

INSTRUCTIONS TO STUDENTS

1. Students should be regular and come prepared for the lab practice.

2. In case a student misses a class, it is his/her responsibility to complete that missed experiment(s).

3. Students should bring and maintain an observation book exclusively for the lab.

4. Once the experiment(s) get executed, they should show the program and results to the instructors and copy the same in their observation book.

5. Prescribed textbook and class notes can be kept ready for reference if required.

6. They should implement the given experiment individually.

7. Questions for lab tests and exam need not necessarily be limited to the questions in the manual, but could involve some variations and / or combinations of the questions.

Course Objectives

- To determine the efficiency of a given algorithm.
- To find the amortized cost of a given algorithm.
- To implement the various operations on advanced data structures - B-Trees, Binomial Heaps
- To implement the shortest path and all pairs shortest path algorithms

Course Outcomes

A student who successfully completes this course would be able to

- Analyze the efficiency of any given algorithm
- Determine Amortized cost of given algorithm
- Implement advanced data structures B-tree and Binomial trees heaps
- Discover shortest path from single source to all other vertices and also all pairs shortest

PROCEDURE FOR EVALUATION

Student will be evaluated for 100 marks based on following criteria

Labs involving implementation of theory subject and mini project

There will be 2 phases.

In first phase, continuous evaluation of the experiments conducted between Week1 and Week 8.

Continuous evaluation → for 40 marks

Four evaluations→ one evaluation per two weeks	
Execution	25 Marks
Viva Voce	15 Marks

Every evaluation carries 10 marks each

In the Second Phase, students will be working on Mini project between Week 9 to Week 12 based on the concept they have been taught in the theory. Any research paper may be referred for this purpose. This will be evaluated for 20 Marks.

Mini Project →20 Marks

Final end semester Examination→ 40 Marks

CONTENTS

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Week 1 :

Write and Execute the following also analyze the time complexity

1. Sort a list of N integers using(a) Selection sort (b) Bubble sort
2. Binary search technique over a list of integers.
3. Stack operations
   (i) Stack-empty(S)
   (ii) Push(S, x)
   (iii) Pop(S)
4. Queue Q also analyze the time complexity.
   (i) Enqueue(Q, x)
   (ii) Dequeue(Q)

Week 2 :

1. Write a program for implementing the following operations of stack S & also find the amortized cost if a sequence of n following operations are performed on a data structure.
   (i) Push(S, x)
   (ii) Pop(S)
   (iii) Multipop(S,k)
2. Write a program to implement INCREMENT operation in a k-bit binary counter that counts upward from 0. What happens to the counter as it is incremented 16 times? Find the amortized cost of this operation if sequences of n increment operations are performed.

Week 3:

Write a program and also find their amortized cost to implement B-tree for t=2 and 3

Week 4:

Write a program and also find their amortized cost to search for a key in the B-tree.

Week 5:

Write a program and also find their amortized cost to do delete a key from a B-tree.

Week 6:

Write a program and also find their amortized cost to implement Binomial –Heap

Week 7:

Write a program and also find their amortized cost for finding the minimum key in Binomial –Heap

Week 8:

Write and Execute the following and also analyze the time complexity

1. Bellman-Ford algorithm.
2. Floyd-Warshall algorithm.

Week 9 - Week 12: Mini Project
Week 13: Test

References:

1. Cormen Thomas H., Leiserson Charles E, Rivest Ronald L. and Stein Clifford, *"Introduction to* Algorithms", (3e), MIT Press, 2009.
2. Cormen Thomas H., Leiserson Charles E, Rivest Ronald L. and Stein Clifford, "*Introduction to Algorithms"* (2e), Prentice-Hall India, 2001.
3. Baase Sara and Gelder A.V., "Computer Algorithms -Introduction to Design and Analysis", (3e), Pearson Education, 2000
4. Anany Levitin, "Introduction to the Design and Analysis of Algorithms ", (3e), Pearson Education, 2011