EASTERN UNIVERSITY, SRI LANKA

Second Examination in Science 2005/2006

First Semester – August/September 2007

CS 201 –Data Structures and Design of Algorithm

Answer all questions
Time allowed: 02 Hours

Q1)

I. Write down three divide-and-conquer steps of sorting a sequence S with n elements for Merge-Sort.

II. Illustrate merge sort using the following data set

| 4 | 0 | 9 | 2 | 7 | 3 | 1 | 8 | 5 |

III. Write down the merge-sort algorithm.

IV. What is the advantage of in-place partition in quick sort? Write down the algorithm for that.

(4 X 25 Marks)

Q2)

Describe briefly the **backtracking** technique with a suitable example. Suppose that S be a given set of integers and M be a given integer number. You are required to find all-possible subsets of S in which the sum of elements of a subset must be equal to M.

Write an algorithm to solve the above problem using backtracking technique.

(40 Marks)

Trace this algorithm for the following set of data:
S= {1, 7, 8, 14} and M=15.

(30 Marks)

Show how you would modify your algorithm to find the sum to be less than or equal to M.

(30 Marks)

Q3)

Define and implement ADT Stack and ADT Queue data structures. Use linked list to represent the list of elements.
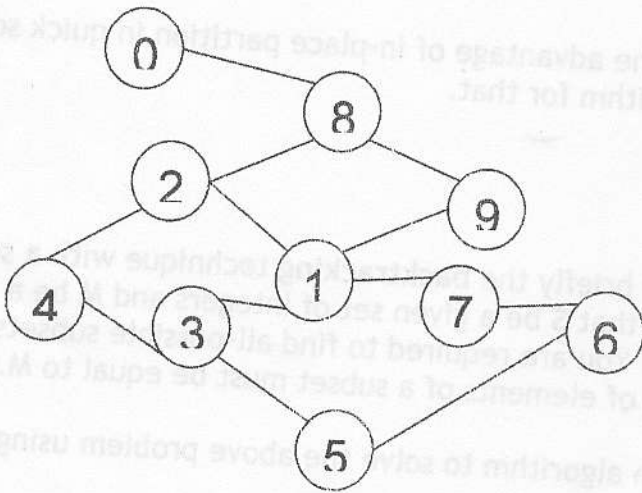
(45 Marks)

Write a C++ program that reads an integer number and verify whether the input number is a palindrome using stack and queue data structure defined above.

(55 Marks)

Q4)

I. What is Big-Oh notation? Explain it.

II. Write Pseudo-code for Searching an Ordinary Binary Tree.

III. Explain Recursive function with a C++ Example.

IV. Write a c++ program to read a M x N matrix into one-dimensional array in a raw major representation, and find the column and row sum.

V. Draw the adjacency matrix for the following graph:

(5 X 20 Marks)