NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
MAY EXAMINATIONS 2005

SUBJECT: OBJECT-ORIENTED PROGRAMMING
CODE: SCS5201

INSTRUCTION TO CANDIDATES

Answer any five questions. Paper contains Seven questions.
All programs must be written in Java

Time: 3 hours

QUESTION ONE

Write a Java program that implements a dynamic list of integers. Include the following operations: void append(int), void delete(int), void display(), boolean isEmpty() and int count() which returns the number of elements in the list. [20]

QUESTION TWO

a) What is the difference between a BTree and a Binary Search Tree. [4]
b) Show the instance variables and interface for a node that belongs to a BTree. [4]
c) Show the instance variables and interface for a node that belongs to an AVL Tree. [4]
d) Demonstrate how a BTree grows by inserting the following values intoa BTree of order 2: 6, 1, 9, 15, 50, 21, 89, 43. [8]

QUESTION THREE

Write an implementation of a binary search tree based on words which are entered by a user. If the following sequence of words are taken as input by the program: apple, banana, pear, apple, peach, pear, banana, peach, apple, the program should produce as output the works arranged into lexicographic order with the number of times the word occurred showing up in parenthesis next to the word. A single line of the output should have the appearance "apple (3)".

[20]

QUESTION FOUR

a) What is the purpose of hashing?

[4]

b) Explain at least two approaches to collision resolution . [4]

c) Write code to implement insertion into a hash table using the two approaches explained above. [8]

d) Which of these approaches is more efficient, and how is this efficiency measured? [4]

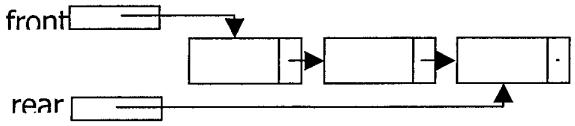
QUESTION FIVE

Write a program that implements a dynamic stack of integers. Include the following operations: void push(int), int pop(), int top() and int stackSize().

[20]

QUESTION SIX

Write a program that implements a queue using the following structure:



Include the following operations: void enqueue(int), int dequeue(), void display() and int count() to return the number of elements in the queue.

[20]

QUESTION SEVEN

a) Show two different alternative representations of a graph. [8]
b) Write classes which indicate how each representation will be handled in a program. Include the following operations: to add a node, and to delete a node. [12]

END OF QUESTION PAPER

GOOD LUCK!