KABARAK **UNIVERSITY**

UNIVERSITY EXAMINATIONS

2008/2009 ACADEMIC YEAR

FOR THE DEGREE OF BACHELOR OF SCIENCE IN

COMPUTER SCINCE

COURSE CODE: COMP 212

COURSE TITLE: OBJECT ORIENTED

PROGRAMMING

STREAM: Y2S1

DAY: TUESDAY

TIME: 2.00 – 4.00 P.M.

DATE: 11/08/2009

INSTRUCTIONS:

- Answer <u>The First Question</u> and any <u>Other Two Questions</u>
- Time: 2 Hours

PLEASE TURN OVER

QUESTION 1 (30 MARKS)

(a). Describe what object oriented programming deals with. **(4 Marks)**

(b). One of the advantages of Object Oriented technology is code simplification i.e. the programmer writes less code. Describe how the following features ensure this code simplification.
   (i). Inheritance   (ii). Polymorphism   **(4 Marks)**

(c). What is an abstract class? Why is the use of abstract classes helpful in large scale programming? Describe giving an example. **(4 Marks)**

(d). List four file open modes as well as their meanings. **(2 Marks)**

(e). Briefly describe how the following special symbols are used in C++. **(6 Marks)**
   (i)   .   (ii) ->   (iii) :   (iv) ::

(f). Assume you are scanning through a C++ program, and you encounter each of the following statements. What will you understand each to be instructing the computer?
   (i)   a b;   (ii) ~a();   (iii) b.c();   (iv) a *q;   **(4 Marks)**

(g). For the following class, write statements to declare a pointer (named **p**) and invoke the member function **s()** using the pointer. **(2 Marks)**

```
class m
{
public:
    int s(float k)
    {
        if (k>0)
            return(1);
        else return(0);
    }
};
```

(h). State the main similarity and the main difference between private members and protected members. **(1 Mark)**

(i). State either **True** or **False** to each. **(3 Marks)**
   (i). Member functions must always be public.
   (ii). Polymorphism of classes in C++ is ensured only through the use of pointers.
   (iii). A class is not allowed to inherited another already inherited class.
   (iv). The application of virtual functions uses inheritance.
   (v). If a class **n** inherits a class **m**, it is absolutely correct for a pointer of type **m** to be used to refer to an object of type **n**.
   (vi). If a protected member of a base class is publicly inherited, then it will be publicly available to objects of the derived class.

QUESTION 2 (20 MARKS)

(a). (i). Explain why we need to declare member functions outside the class. Also illustrate
how we do this. **(3 Marks)**

(ii). What is a static data member? Why would we want to use it? **(2 Marks)**

(iii). Assume a class inherits another class using <u>public</u> inheriting mode. State what happens
to the following members of the base class. **(1.5 Marks)**
(I). Private members   (II). Protected members   (III).   Public members

(iv). Repeat a (iii) above using <u>private</u> inheriting mode instead of public. **(1.5 Marks)**

(b). (i). Describe how we pass and return objects. **(3 Marks)**

(ii). Write a <u>class</u> named **integer** which contains one integer-type data member, and a
member function (named **get()**) to input the value of the data member, and another
member function (named **larger()**) that receives two objects as parameters and returns
the one that is larger than the other (has a larger value of the integer). **(4 Marks)**

(iii). Write appropriate statements to declare instances of the class integer and invoke the two
members (**get()** and **larger()**). **(2 Marks)**

(c). Assume a class named **t** with a void member function named **m()**. Write appropriate
statements to input the size of instances that we want, create an array instance of that size,
and then call the member function **m()** for each of the 20 instances. **(3 Marks)**

QUESTION 3 (20 MARKS)

(a). Describe how we achieve inheritance and polymorphism of classes in C++. **(4 Marks)**

(b). Consider the following class for storing the code and name of a member of staff at Kabarak
University.

```
class staff
{
    int code;
    char name[50];
};
```

Required: Rewrite the class to include the following member functions.

(i). The <u>prototypes</u> of the following constructors: A default constructor, a parameterized
constructor, and a copy constructor. **(3 Marks)**

(ii). The <u>definitions</u> of the above three constructors when defined <u>outside the class</u>.
(4 Marks)

(iii). A member function named **show()** that displays the details of the staff as well as a member function **getname()** that returns the name of a member of staff.. **(2 Marks)**

(c). One type of a member of staff (from part (c) above) is a lecturer who in addition to the code and the name, also has the area of specialization as the third detail, and so we can define a new class named **lecturer** that inherits the class **staff**.

Required

(i). Write the definition of the class **lecturer** so as to inherit **staff**. Also include a parameterized constructor for this class. **(2 Marks)**
Hint: This constructor should pass values to the parameterized constructor of **staff**.

(ii). Write an appropriate **main()** function to include creating an instance of the class of **lecturer**, and invoking the appropriate member functions for the instance using a pointer.
(3 Marks)

(d). From part (b) and (c) above, it is clear that the detail of area of specialization will not be displayed when **show()** is invoked. How can we display all the three details of a lecturer (code, name and area of specialization) using polymorphism? Illustrate. **(2 Marks)**

QUESTION 4 (20 MARKS)

(a). List four C++ classes for files manipulation as well as their work. **(2 Marks)**

(b). Describe how do the following. Use sample C++ code.
(i). Create a new file. **(2 Marks)**
(ii). Append to a file. **(2 Marks)**
(iii). Read from a file. **(2 Marks)**

(c). Write a C++ program that creates a file for storing codes of items and their prices. The program should allow the user to input records of items, display details of all items in the file, and search for the price of an item (input its code). **(12 Marks)**

QUESTION 5 (20 MARKS)

A retail company sales three categories of items: electronics, books and consumer goods. The details stored for the items include a unique item code, name, price, as well as the stock. Also stored is the author, the edition, the publisher and the year of publication of a book (incase of a book). Other details include the discount rate (only for electronic goods), the guarantee time in days (only for electronics), tax rate percentage (for all items), and the government permit number (only for electronics).

The operations done on the items include registering a new item, outputting details of an item (when user supplies the item code), selling an item (update stock appropriately), purchasing an item (update stock appropriately), computing tax as well as incrementing the total tax for each type of item, computing the discount given (for electronics), etc.

Required: Write definitions of the classes for this problem using polymorphism.   **(20 Marks)**