University of Swaziland
Department Of Computer Science
Main Examination December 2017

Title of paper   : C under Linux

Course number   : CS344

Time Allowed   : Three (3) hours

Instructions:

- Answer ALL Questions in section A.

- Answer any three (3) questions in section B.

- Each question is worth 25 marks.

This paper may not be opened until permission has been granted by the invigilator.

Section A

QUESTION 1 [25 marks]

i. Fill in the blanks in the following (Note: Just write down the missing words)   [10]

   a) Pascal, BASIC, and C are p____ languages, while C++ is an o _____.language.

   b) The two major components of an object are ____ and functions that _____.

   c) The ability of a function or operator to act in different ways on different data types is called _____.

   d) A C++ instruction that tells the computer to do something is called a _____.

   e) The expression 11%3 evaluates to _____.

   f) The closing brace of a structure is followed by a _____.

   g) In general, an inline function executes _____ than a normal function, but requires _____ memory.

   h) Storage class is concerned with the _____ and _____ of a variable.

   i) A constructor's name is the same as _____.

   j) The only technical difference between structures and classes in C++ is that _____.

ii. Distinguish between the following pairs (Note: write down with appropriate example):

        [15]

   a) Private class and Public base class.

   b) Abstract and Concrete class

   c) Call by value and Call by reference.

   d) Public and Private Inheritance.

   e) Operation polymorphism and Inclusion Polymorphism.

Section B

QUESTION 2 [25 marks]

i. Write the C++ syntax and draw the activity diagram for the following statements.   [12]

    a) For loop

    b) If-else statement

    c) Switch statement

    d) Do..While loop

ii. How can be an array used as Class Member Data, explain with a suitable C++ program?

[8]

iii. If you have two fractions, a/b and c/d, their sum can be obtained from the formula   [5]

```
a     c     a*d + b*c
--- + --- = -----------
b     d        b*d
```

For example, 1/4 plus 2/3 is

```
1     2     1*3 + 4*2     3 + 8     11
--- + --- = ----------- = ------- = ----
4     3        4*3          12       12
```

Using C++, write a program that enables the user to enter two fractions, and then displays their sum in fractional form. (You don't need to reduce it to lowest terms.) The interaction with the user must look like this:

Enter first fraction: 1/2
    Enter second fraction: 2/5
    Sum = 9/10

i.   Why do we need Object-oriented programming? Discuss the difference between   [5]
       Structured and Object-oriented programming language.

ii.   Create a class called employee that contains a name (an object of class string) and an   [10]
       employee number (type long). Include a member function called getdata( ) to get data from
       the user for insertion into the object, and another function called putdata( ) to display the
       data. Assume the name has no embedded blanks.

       Write a main( ) program to test this class. It should create an array of type employee, and
       then invite the user to input data for up to 100 employees. Finally, it should print out the data
       for all the employees.

iii.   Create a class called time that has separate int member data for hours, minutes, and   seconds.
       One constructor should initialize this data to 0, and another should initialize it to fixed
       values. Another member function should display it, in 11:59:59 format. The last member
       function should add two objects of type time passed as arguments.   [10]

       A main( ) program should create two initialized time objects (should they be const?) and one
       that isn't initialized. Then it should add the two initialized values together, leaving the result
       in the third time variable. Finally it should display the value of this third variable. Make
       appropriate member functions const.

QUESTION 4 [25 marks]

i. What are C-Strings? What does concatenation of strings mean? Show the output of the below program. [13]

```cpp
#include <iostream>
#include <cstring>
using namespace std;

class part
    {
    private:
            char partname[30];
            int partnumber;
            double cost;
    public:
            void setpart(char pname[], int pn, double c)
                {
                strcpy(partname, pname);
                partnumber = pn;
                cost = c;
                }
            void showpart()
                {
                cout << "\nName=" << partname;
                cout << ", number=" << partnumber;
                cout << ", cost=$" << cost;
                }
    };

int main()
    {
    part part1, part2;
    part1.setpart("handle bolt", 4473, 217.55);
    part2.setpart("start lever", 9924, 419.25);
    cout << "\nFirst part: "; part1.showpart();
    cout << "\nSecond part: "; part2.showpart();
    cout << endl;
    return 0;
    }
```

ii. What is operator overloading? Discuss with an appropriate C++ program about overloaded ++ operator in both prefix and postfix. [12]

QUESTION 5 [25 marks]

i. What is Inheritance in OOP? Discuss the generalization in UML class diagrams. [4]

ii. Imagine a publishing company that markets both book and audiocassette versions of its works. Create a class publication that stores the title (a string) and price (type float) of a publication. From this class derive two classes: book, which adds a page count (typeint), and tape, which adds a playing time in minutes (type float). Each of these three classes should have a getdata() function to get its data from the user at the keyboard and a putdata() function to display its data.

Then Add a base class sales that holds an array of three floats so that it can record the dollar sales of a particular publication for the last three months. Include a getdata() function to get three sales amounts from the user, and a putdata() function to display the sales figures. Alter book and tape classes so they are derived from both publication and sales. An object of class book or tape should input and output sales data along with its other data. . [12]

Write a main() function to create a book object and a tape object and test their input/output capabilities.

iii. What does aggregation in OOP means? Write a C++ program demonstrating the use of overloading functions in base and derived classes. [9]

End of Question Paper