

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
COMPUTER SCIENCE DEPARTMENT
MAY 2001 EXAMINATIONS

SUBJECT: OBJECT-ORIENTED PROGRAMMING: USING C++
CODE: SCS5201

INSTRUCTIONS TO CANDIDATES

1. Answer any four questions.
2. Marks are indicated in brackets []

LIBRARY USE ONLY

Maximum marks: 100
Time: 3 HOURS

QUESTION 1

- a) State whether the following statements are TRUE or FALSE:
- i) A prototype cannot improve into a final product.
 - ii) The user has no role in the analysis and design of a system.
 - iii) Member functions defined inside a class specifier become in line functions by default.
 - iv) When arguments are passed by value, the function works with the original arguments in the calling program.
 - v) The output function print () cannot be used in C++ programs.
 - vi) Polymorphism is extensively used in implementing inheritance.
 - vii) One problem with OOP is that once a class is created it can never be changed.
 - viii) Data items in a class must always be private.
 - ix) Object-oriented approach cannot be used to create Databases.
 - x) A function designed as public can be accessed like any other ordinary functions.
 - xi) The concept of using one operator for different purposes is known as operator overloading.
 - xii) Since C is a subset of C++, all C programs will run under C++ compilers. [12]
- b) Write a C++ statement to:
- i) Print the value of X and decrease X by 0.5 as long as X is positive. [6]
 - ii) Print a list of points (X,Y) on the graph of
$$Y = X^3 - 3X + 1$$

For X ranging from -2 to 2 in steps of 0.1.

[7]

QUESTION 2

- a) Distinguish between the following terms:
- i) Objects and classes
 - ii) Data abstraction and data encapsulation
 - iii) Inheritance and polymorphism
 - iv) Dynamic binding and message passing. [8]
- b) How are the data and functions organized in object oriented program? [5]
- c) An election is contested by five candidates. The candidates are numbered 1 to 5 and the voting is done by marking the candidate number on the ballot paper. Write a C++ program to read the ballots and count the votes cast for each candidate using an array variable `count`. In case, a number read is outside the range 1 to 5, the ballot should be considered as a "spoilt ballot" and the program should also count the number of spoilt ballots. [12]

QUESTION 3

- a) Explain the method of Dynamic initialization. [5]
- b) When will you make a function `inline`. Why? Illustrate the use of `inline` functions. [7]
- c) Consider a shopping list of items for which an order is placed with a dealer every month. The list includes details such as code number and price of each item. Write a C++ program which perform operations like adding an item, deleting an item from the list and printing the total value of the order. Use a class with arrays as data members. [13]

QUESTION 4

What will be result of the following segments of programs?

- a)

```
for (i = 0.25; i < 1.0; i = i + 0.25)
{
    cout . Precision (5);
    cout . Width (7);
    cout << i;
    cout . Width (10);
    cout << i*j << "\n";
}
```

 [7]

```

b) #include <iostream.h>
int count = 0;
class alpha
{
public:
    alpha ()
    {
        count++;
        cout << "\n No. of. Objects created" << count;
    }
    ~alpha ()
    {
        cout << "\n No. of. Objects destroyed" << count;
        count--;
    }
};
main ()
{
    cout << "\n\n enter Main \n";
    alpha A1, A2, A3, A4;
    {
        cout << "\n\n Enter block 1\n";
        alpha A5;
    }
    {
        cout << "\b\b Enter block 2\n";
        alpha A6;
    }
    cout << "\n\n Re-Enter Main\n";
}

```

[9]

```

c) #include <iostream.h>
#include <iomanip.h>
main ()
{
    cout.setf (ios :: showpoint);
    cout << setw(5) << "n"
        << setw(15) << " Inverse_of_n"
        << set w(15) << "sum_of_terms\n\n";
    double term, sum = 0;
    for (int n=1; n=10; n++)
    {
        term = 1.0 / float (n);
        sum = sum + term;
        cout << set w(5) << n
            << set w(14) <, setprecision (4)
            << set iosflags (ios :: scientific) << term
    }
}

```

```

        << set w (13) << resetiosflags (ios :: scientific)
        << sum i
        << endl;
    }
}

```

[9]

QUESTION 5

- a) Write a C++ program that reads the name of a file and then determines how many lines are in the file. [10]
- b) The level of air pollution in the city of HARARE is measured by a pollution index. Readings are made at 12:00 p.m. at three locations: the cement plant, downtown at the corner of Leopold Takawira street and Samora Machel Avenue, and at randomly selected location in a residential area. The average of these three readings is the pollution index and a value of 50.00 or greater for this indicates a "hazardous" condition, whereas values lower than 50.0 indicate a "safe" condition. Because this index must be calculated daily, the HARARE environmental statistician would like a program that calculates the pollution index and they determines the appropriate condition, safe or hazardous. Write a C++ program which reads 3 pollution levels, calculate an air pollution index as their average, and displays an appropriate air-quality message. Give sample run and display the output. [10]
- c) Distinguish between object-oriented system analysis and design. which of the two requires more creative talents of the system developer? [5]

QUESTION 6

- a) Describe how an object of a class that contains objects of other classes are created. [5]
- b) Write a program that uses nested for loops to print the following multiplication table:

	1	2	3	4	5	6	7	8	9
1	1								
2	2	4							
3	3	6	9						
4	4	8	12	16					
5	5	10	15	20	25				
6	6	12	18	24	30	36			
7	7	14	21	28	35	42	49		
8	8	16	24	32	40	48	56	64	
9	9	18	27	36	45	54	63	72	81

- c) Write a function whose parameter is the number of a month and whose return value is the corresponding value of type month abbrev. [7]

QUESTION 7

- a) What do you think are the major issues facing the software industry today? [5]
- b) What are the critical issues that are to be considered while designing a driver program? Why? [5]
- c) Give a brief C++ program that reads the names of a file and then determines how many lines are in the file. [10]
- d) Give a brief note on fstream objects and their operations. [5]

END OF QUESTION PAPER

