UNIVERSITY EXAMINATIONS

EXAMINATION FOR JANUARY/APRIL 2023/2024 FOR CERTIFICATE IN INFORMATION TECHNOLOGY

RCT002: FUNDAMENTALS OF PROGRAMMING

DATE: 12th April 2024 **TIME: 2 HOURS**

GENERAL INSTRUCTIONS:

Students are NOT permitted to write on the examination paper during examination time.

This is a closed book examination. Text book/Reference books/notes are not permitted.

SPECIAL INSTRUCTIONS:

This examination paper consists Questions in Section A followed by section B.

Answer **Question 1 and any Other Two** questions.

QUESTIONS in ALL Sections should be answered in answer booklet(s).

1. **PLEASE start the answer to EACH question on a NEW PAGE.**
2. **Keep your phone(s) switched off at the front of the examination room.**
3. **Keep ALL bags and caps at the front of the examination room and DO NOT refer to ANY unauthorized material before or during the course of the examination.**
4. **ALWAYS show your working.**
5. **Marks indicated in parenthesis i.e. ( ) will be awarded for clear and logical answers.**
6. **Write your REGISTRATION No. clearly on the answer booklet(s).**
7. **For the Questions, write the number of the question on the answer booklet(s) in the order you answered them.**
8. **DO NOT use your PHONE as a CALCULATOR.**
9. **YOU are ONLY ALLOWED to leave the exam room 30minutes to the end of the Exam.**
10. **DO NOT write on the QUESTION PAPER. Use the back of your BOOKLET for any calculations or rough work.**

SECTION A (COMPULSORY-ANSWER ALL QUESTIONS)

Question One (30marks)

1. Comments in programming are denoted by: **(1mark)**

   a. Two forward slashes (//).

   b. Three forward slashes (///).

   c. A slash and a star (/*).

   d. A slash and two stars (/**).

2. Which of the following does *not* cause a syntax error to be reported by the C++ compiler? **(1mark)**

   a. Mismatched { }.

   b. Missing */ in a comment.

   c. Missing ; at the end of a statement.

   d. Extra blank lines.

3. Which of the following is *not* a syntax error? **(1mark)**

   a. cout << 'Hello world! ';

   b. cout << "Hello world! ";

   c. cout << "Hello world! ";

   d. cout << Hello world!;

4. The escape sequence for a newline is: **(1mark)**

   a. \n

   b. \t

   c. \r

   d. \a

5. Which of the following is *not* a valid C++ identifier? **(1mark)**

   a. my Value

   b. _AAA1

   c. width

   d. m_x

6. Which is the output of the following statements? **(1mark)**

```
cout << "Hello ";
cout << "World";
```

a. Hello World

b. World Hello

c. Hello
World

d. World
Hello

7. Which of the following is the escape character? **(1mark)**

a. *

b. \

c. \n

d. "

8. Which of the following is a variable declaration statement? **(1mark)**

a. int total;

b. #include <iostream>

c. int main()

d. // first string entered by user

9. The _____ enables a program to read data from the user. **(1mark)**

a. cout.

b. cin.

c. cread.

d. cget.

10. The assignment operator _____ assigns the value of the expression on its right to the variable on its left. **(1mark)**

a. <-

b. ->

c. =

d. #

11. Which of the following statement shows the initialization of the variable count to 0? **(1mark)**

    a. int count = 0;

    b. int count[0];

    c. int count(0);

    d. int count{0};

12. Which of the following statements does *not* overwrite a preexisting value stored in a memory location? **(1mark)**

    a. int a;

    b. number = 12;

    c. y = y + 2;

    d. width = length;

13. In what order would the following operators be evaluated. **(1mark)**

    -, *, /, +, %

    Assume that if two operations have the same precedence, the one listed first will be evaluated first.

    a. +, -, /, *, %

    b. -, +, %, *, /

    c. -, *, %, +, /

    d. *, /, %, -, +

14. Which of the following is *not* an arithmetic operator? **(1mark)**

    a. +

    b. -

    c. =

    d. %

15. What will be the output after the following C++ statements have been executed? **(1mark)**

int a=4;

```
int b=12;
int c=37;
int d=51;
if (a < b) {
  cout << "a < b" << endl;
}

if (a > b) {
  cout << "a > b" << endl;
}

if (d <= c) {
        cout << "d <= c" << endl;
}

if (c != d) {
  cout << "c != d" << endl;
}
```

a. a < b
   c != d

b. a < b
   d <= c
   c != d

c. a > b
   c != d

d. a < b
   c < d
   a != b

16. Which of the following is a compilation/syntax error? **(1mark)**

a. Neglecting to declare a local variable in a function before it is used.

b. Using a triple equals sign instead of a double equals sign in the condition of an if statement.

c. Omitting the left and right parentheses for the condition of an if statement.

d. All of the above.

17. Each of the following is a relational or equality operator *except*: **(1mark)**

a. <=

b. =!

c. ==

d. >

In the questions that follow state whether TRUE or FALSE

18. All variables must be declared before they're used. **(1mark)**
19. C++ considers the variables number and NuMbEr to be identical. **(1mark)**
20. All variables must be given a type when they're declared. **(1mark)**
21. All preprocessor directives must begin with #. **(1mark)**
22. Reserved words can be used as variables in a program. **(1mark)**
23. The default case is required in the switch selection statement. **(1mark)**
24. The expression (x > y && a < b) is true if either the expression x > y is true or the expression a < b is true. **(1mark)**
25. **++ and +** are the same in programming. **(1mark)**
26. The break statement is required in the default case of a switch selection statement to exit the switch properly. **(1mark)**
27. An expression containing the || operator is true if either or both of its operands are true. **(1mark)**
28. When a variable uses float or double datatype, the memory location can accept decimal values. **(1mark)**
29. = and = = are the same in programming. **(1mark)**
30. A variable and a constant behave in the same manner in terms of storage of data.**(1mark)**

SECTION B (ANSWER ANY TWO QUESTIONS)

Question Two (15marks)

a. State whether each of the following is true or false. In each explain why.
   i. By convention, function names begin with a capital letter and all subsequent words in the name begin with a capital letter. **(2marks)**
   ii. Empty parentheses following a function name in a function prototype indicate that the function does not require any parameters to perform its task. **(2marks)**

iii. Data members or member functions declared with access specifier private are accessible to member functions of the class in which they're declared. **(3marks)**

iv. Variables declared in the body of a particular member function are known as data members and can be used in all member functions of the class. **(2marks)**

v. Every function's body is delimited by left and right braces ({and}) **(2marks)**

vi. Any source-code file that contains int main() can be used to execute a program. **(2marks)**

vii. The types of arguments in a function call must be consistent with the types of the corresponding parameters in the function prototype's parameter list.**(2marks)**

Question Three (15marks

a. List three relational operators used in control structures. **(3marks)**

b. Outline four selection control structures used in programming. **(4marks)**

c. The following is a portion of a program. Use it to answer the questions that follow

```
int age = 22;
if (age < 18) {
  cout << "Good morning.You are under age";
} else if ( age < 25) {
  cout << "You are an under graduate.";
} else {
  cout << "You are done with school. Congratulations!";
}
```

i. Identify the

1. Type of control structure that has been used in the program **(2marks)**
2. The variable in the program **(1mark)**

ii. What will be the output of the program? **(1mark)**

iii. Write a full program that will run using console. **(5marks)**

Question Four (15marks)

a. Study the program below and answer the questions that follow.

```
int gradeCounter; // number of the grade to be entered next
int total; // sum of grades
int grade; // grade value entered by user
int average; // average of grades
total = 0; // initialize total
```

```
for(int gradeCounter = 1; gradeCounter <= 10; gradeCounter ++)
 {
cout << "Enter grade: ";
cin >> grade;
total = total + grade;
}
average = total / 10;
cout << "\nTotal of all 10 grades is " << total << endl;
cout << "Class average is " << average << endl;
```

i. How many memory locations will be created by the program? **(1mark)**

ii. Identify the type of loop control structure used in the program. (**1mark**)

iii. Name the variables present in the program. **(4marks)**

iv. Convert the program above to use a **do..while** control structure (**5marks**)

b. State whether the statement is true or false.

i. There are two types of control structures-selection and loop control structure. **(1mark)**

ii. A structure comprises of elements of the same type. **(1mark)**

iii. A pointer is a memory location that stores values **(1mark)**

iv. Reserved word in programming can be used as variables in a program. **(1mark)**

Question Five (15marks)

From question a to h below write a single C++ statement or portions of statements that do the following:

a. Input integer variable x **(2marks)**

b. Set integer variable i to 1. **(1mark)**

c. Multiply variable power by x and assign the result to power. **(2marks)**

d. Preincrement variable i by 1. **(2marks)**

e. Determine whether i is less than or equal to y. **(2marks)**

f. Output integer variable power **(2marks)**

g. The example below is a portion of an array
int primes[10]={2,3,5,7,11,13,17,19,23,29};

i. Define the term array. **(1mark)**

ii. What type of array is it? (**1mark**)

iii. Identify the output value of int primes[7] **(1mark)**

iv. How many elements are in the array (**1mark**)