الجامعة الإسلامية العالمية ماليزيا

INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

FINAL EXAMINATION
SEMESTER 1, 2016/2017 SESSION

KULLIYYAH OF INFORMATION AND COMMUNICATION TECHNOLOGY

Programme	: **BCS/BIT/ENM/HS/RK**	Level of Study	: **Undergraduate**
Time	: **9:00 AM – 12:00 NOON**	Date	: **5 January 2017**
Duration	: **3 Hr(s) 00 Min(s)**	Section(s)	: **All**
Course Code	: **CSC 1100**		
Course Title	: **ELEMENTS OF PROGRAMMING**		

This Question Paper consists of **13** printed pages including Cover Page containing **3** parts:

PART **A**: **20** Multiple Choice Questions (**20** marks)
PART **B**: **4** Short Answer Questions (**20** marks)
PART **C**: **2** Coding Questions (**40** marks)

INSTRUCTION(S) TO CANDIDATES

DO NOT OPEN UNTIL YOU ARE ASKED TO DO SO
ANSWER ALL QUESTIONS IN THE ANSWER BOOKLET

Any form of cheating or attempt to cheat is a serious offence which may lead to dismissal

APPROVED BY

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PART A: MULTIPLE CHOICE QUESTIONS [20 MARKS]

Instruction: Write your answer in the Answer Booklet

1. Which of the following statements generate a syntax error?

   A. `char *str = "Hello World";`
   B. `char str[11] = "Hello World";`
   C. `char str[20] = "Hello World";`
   D. `char str[] = {'H', 'e', 'l', 'l', 'o', '\0'};`

2. Which is ***NOT*** a possible value of variable num when executing the following expression?

```
num = rand() % 10;
```

   A. 0
   B. 1
   C. 5
   D. 10

3. Based on the codes below, what should be the value for `pointer2`?

```
int x = 7;
int* pointer1 = &x;
int* pointer2 = pointer1;
```

Variables	Value	Memory address
`int x`	7	2000
`int* pointer1`	2000	2004
`int* pointer2`	?	2008

   A. 7
   B. 2000
   C. 2004
   D. 2008

4. Given the following C++ statements:

```
int NumOne[5], NumTwo[10];
NumTwo[5] = 21;
```

Which of the following statements are ***CORRECT***?

A. In the first statement, the value 5 refers to an array size, whereas in the second statement, it refers to one specific element of an array.
B. In the first statement, the value 5 refers to one specific element, whereas in the second statement, it refers to the total number of elements.
C. In the first statement, the value 5 refers an array size, whereas in the second statement, it assigns a value for the sixth element.
D. In the first statement, the value 5 specifies the number of elements, whereas the second statement assigns a value to all five elements.

5. Which of the following is TRUE given the C++ codes below?

```
num = 22;
cout << "The value stored in num is " << num << endl;
cout << "The address of num = " << &num <<endl;
```

A. num is a pointer
B. address of num is 22
C. the address of num is displayed in the second line of output
D. the first line of output displays the number of byte allocated for num

6. The following are the advantages for properly performing file closing after use EXCEPT:

A. Data will not be lost
B. Object can then be used for another file
C. Good programming practice is to close files no longer needed
D. The object will be disconnected between file external name and file stream object

7. A counter is a _____ regularly incremented or decremented each time a loop iterates.

A. variable
B. function
C. string literal
D. closing brace

8. What are the default parameter passing methods to functions for arrays and pointers?

   A. Arrays and pointer are passed by value to functions.
   B. Arrays and pointer are passed by reference to functions.
   C. Arrays are passed by value while pointers are passed by reference to functions.
   D. Arrays are passed by reference while pointers are passed by value to functions.

9. Which of the following is the output from the given program?

```
#include <iostream>
#include <string>
#include <math.h>
using namespace std;

int main() {

      int x = 100;
      int y = 200;
      int* ptrnum = &x;
      y = sqrt(x)* y;
      *ptrnum = pow(sqrt(x),3);
      x *= 4;

      cout<< y<<" "<<x<<endl;
      return 0;
}
```

   A. 100 200
   B. 2000 1000
   C. 1000 2000
   D. 2000 4000

10. Which of the following is not a valid function call?

   A. `CalcY();`
   B. `CalcY(x);`
   C. `void CalcY(y);`
   D. `y = CalcY(x, f, 25);`

11. Which statement is used to skip the remainder of the body of a repetition statement and proceed with the next iteration of the loop?

   A. `skip`
   B. `break`
   C. `proceed`
   D. `continue`

12. Given the following C++ declarations:

```
int Blue [2][2] = {{3, 6}, {7, 11}};
int Red [2][2] = {{9, 6}, {17, 42}};
int Purple [2][2], b, r;
```

Which of the following correctly adds the elements of the arrays **Red** and **Blue** into the array **Purple**?

A.
```
for (b=0; b<2; ++b)
     Purple[b] = Blue[b] + Red[b];
```

B.
```
for (r=0; r<2; ++r)
     Purple[r] = Blue[r] + Red[r];
```

C.
```
for (b=0; b<2; ++b)
     for (r=0; r<2; ++r)
          Purple[b][r] = Blue[r][b] + Red[r][r];
```

D.
```
for (b=0; b<2; ++b)
     for (r=0; r<2; ++r)
          Purple [b][r] = Blue[b][r] + Red[b][r];
```

13. Which of the following is TRUE about user-defined structures?

A. A structure can comprise of data of several types.
B. Variables can only be declared separately after the `struct` definition
C. A definition a `struct` type will be allocated into a specific storage location.
D. The members of a variable declared as structure type can be accessed directly like any other variable.

14. Assume the following declarations are made:

```
int array b[5], *bPtr;
```

Which of the following is a valid C++ statement?

A. `bPtr = b+2;`
B. `bPtr = &b;`
C. `&bPtr = *b;`
D. `*bPtr = &b;`

15. Given below is a program segment based on a searching algorithm:

```
int numbers[SIZE];
int target = NUM, index, found;
found = 0;
index = 0;
while ( _____________________)
     if (numbers[index] == target)
          found = 1;
     else
          index++;
if (found)
    cout <<"Number is found at position "<< index+1 <<endl;
else
    cout <<"Not found! " <<endl;
```

Which of the following completes the code above?

A. `index < SIZE`
B. `index != found`
C. `index < SIZE && found != 0`
D. `index != found && found <SIZE`

16. Assume the program needs to output a set of numbers.

```
const int ARRAY_SIZE = 3;
int count;
int numbers[ARRAY_SIZE]= { 1, 2, 3};
cout<< "The numbers are: ";

for (count=0; count < ARRAY_SIZE ;count++)
  cout<< numbers[count] << "";
cout << endl;
```

What is the purpose of this expression `count < ARRAY_SIZE` ?

A. To relate the loop and the array size
B. To iterate the loop so it is more than array size
C. To stop the loop from writing beyond the array size
D. To condition the loop so it is the bigger than array size

17. Given the following `struct` declaration,

```
struct Employee{

      char ID[5];
      char name[30];
      double salary;
};

Employee driver, gardener;
```

Which of the statements below is TRUE?

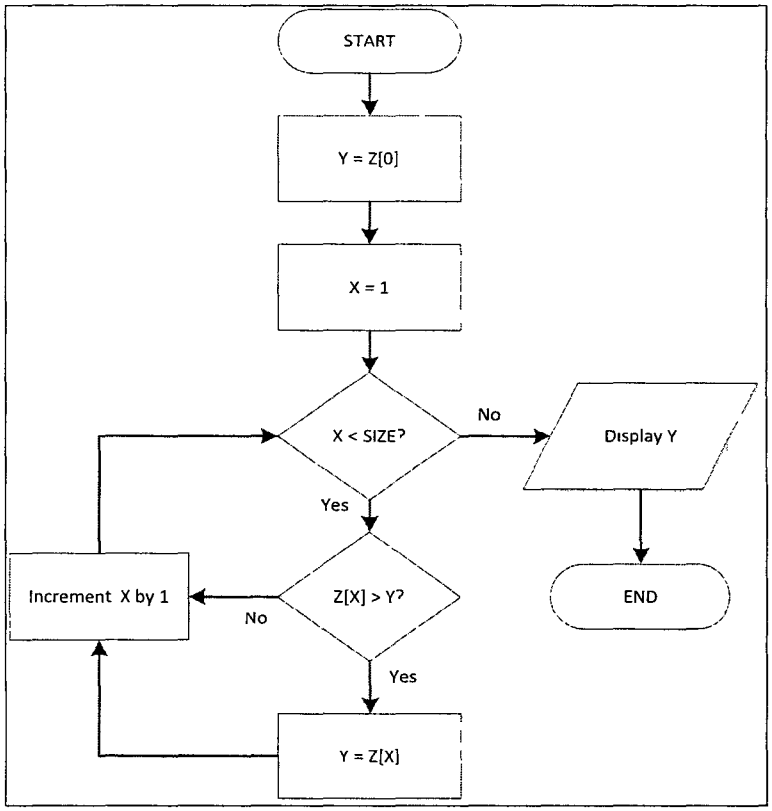
A. `Employee` is a variable name.
B. `salary` is a variable of type double
C. `salary` is a variable of type `Employee`
D. `driver` and `gardener` are declared as `Employee` type

18. Analyse the following codes and choose one of the answers below to best describe about the algorithm.

```
int values[6] = {7, 2, 3, 8, 9, 1};
sortArray(values, 6);
void sortArray( int array[], int size){

      bool swap;
      int temp;
      do{
            swap = false;

            for (int count=0; count<(size-1);count++){

            if ( array[count] > array[count + 1]){
                        temp = array[count];
                        array[count] = array [count+1];
                        array[count+1] = temp;
                        swap=true;
                  }
            }
      }while(swap);
}
```

A. Sorting the array in repeated order.
B. Sorting the array in the right order.
C. Sorting the array in ascending order.
D. Sorting the array in descending order.

19. Given the following flowchart:



Which of the following **CORRECTLY** describes the algorithm in the flowchart above?

A. All numbers in the array Z are displayed.
B. The total of the numbers in the array Z is displayed.
C. The highest number in the array Z is determined and displayed.
D. All even numbers in the array Z are added and the total is displayed.

20. Which of the following characters is used to mark a stream of input data in a file?

A. `\n`
B. `eof()`
C. Null character `\0`
D. Close brace `}` character

PART B: SHORT-ANSWER QUESTIONS [20 MARKS]
Instructions: Answer ALL questions. Write your answer in the Answer Booklet provided.

Question 1 **[2 marks]**

Assuming that the variables have been declared and the necessary header files have been included; write ONE C++ assignment statement for the following arithmetic expression using the appropriate built-in functions:

$$result = \frac{m^3}{2t - \sqrt{y}}$$

Question 2 **[2 marks]**

Assuming the necessary header files are included, give ONE correct C++ statements following the `srand` statement to display a random number ranging from 100 to 350.

```
srand (time(NULL));
```

Question 3 **[6 marks]**

This C++ program asks the user to input the values for an integer array; and display the array elements.

Find errors in the following program. Explain each error and provide the corrections.

```
#include <iostream>
#include <cstring>
using namespace std;
#define SIZE 4
int main(){

    int arr[SIZE];

    for(i=1; i<=size+1; i++)
    {
        cin >> arr[i];
        cout << arr[i];
    }
    return 0;
}
```

Question 4 **[10 marks]**

Find five errors in this program and provide the corrected statements. The hints are given in the description of the program.

```
//This program performs string manipulation on a DNA string.
//A DNA string comprises of 'A', 'C', 'G' and 'T' bases.
//In particular, the function reverse_complement() does
//the following:
//1. Changing the bases of 'A' to 'T', 'C' to 'G',
//   'G' to 'C' and 'T' to 'A'
//2. Reversing the order of character positions,
//   i.e. 1st position to be the last position,
//   the 2nd position to be the 2nd last position
//   and so on.
//  It accepts a DNA string to be manipulated & returns nothing.

#include <iostream>
#include <cstring>
#DEFINE SIZE 15
using namespace std;

int reverse_complement(char []);

int main(){

    //declaring two arrays of characters:
    //'humanDNA_original' holds the DNA string to be translated
    //'humanDNA_translated' holds the translated DNA string
    char humanDNA_original[] = "CGTCCATAGCCACG";
    int humanDNA_translated[SIZE];

    //copying the original string to 'humanDNA_translated'
    strcpy(humanDNA_translated, humanDNA_original);

    //calling function
    reverse_complement(humanDNA_translated, SIZE);

    //printing the original and translated string
    cout<<humanDNA_original<<endl;
    cout<<humanDNA_translated<<endl;

    return 0;
}
```

```
void reverse_complement(char stringDNA[]){

    int i;

    //declaring an empty character array
    char tempDNA[SIZE] = "";

    for(i = 0; i < (SIZE-1); i++){

        if(stringDNA[i] == 'A'){

            stringDNA[i] = 'T';

        }else if(stringDNA[i] == 'C'){

            stringDNA[i] = 'G';

        }else if(stringDNA[i] == 'G'){

            stringDNA[i] = 'C';

        }else if(stringDNA[i] == 'T'){

            stringDNA[i] = 'A';

        }
    }
    //changing the order of character positions,
    //i.e. from 1st position to last position,
    //from 2nd position to 2nd last position and so on.
    for(i = 1; i < SIZE; i++){

        tempDNA[SIZE-i-1] = stringDNA[i-1];

    }
    //copying the temporary result to stringDNA array
    strcpy(stringDNA, tempDNA);
    return 0;
}
```

PART C: CODING [40 MARKS]
Instructions: Answer ALL questions. Write your answer in the Answer Booklet provided.

Question 1 **[20 marks]**

Write a function that receives, as parameter, an array that contains the prices of some products in a shop. The function calculates the minimum, the maximum and the average of the prices. The function should have the following header:

```
void stat_arr(float arr[],float *min, float *max, float *avg)
```

Also write the `main()` module that reads the prices of up to 10 products and stores them in an array. If the user enters -1, the insertion of prices should terminate.

The program should use the function to determine the values for minimum, the maximum and the average of the prices, but display these values within the `main()` module.

Question 2 **[10 marks]**

Student records: Every semester, Mahallah Asiah keeps a record of how many students coming from each Kulliyyah. For Semester 1, 2016/2017, the record is kept in a file named `"mahallah.asiah.txt"`, which is shown as below:

```
1 KOE 15
1 KENMS 34
1 KICT 32
1 AIKOL 8
1 KOED 45
2 KOE 5
2 KENMS 17
2 KICT 10
2 AIKOL 11
2 KOED 23
```

The first column represents the category of students, whether undergraduate (1) or postgraduate (2). The second column represents the Kulliyyah the students belong to. The third column gives the number of students.

In particular, you need to:

1. Create a structure `stud_record` that has three data members to represent a student record as shown in `"mahallah.asiah.txt"`. [4 marks]

2. Create a `main()` function with the following details:

    a. Read the file and properly check whether the file can be opened. [4 marks]

    b. Read the data and store them in an array of structure objects. [6 marks]

    c. Calculate the total number of undergraduate and postgraduate students and print them on the screen. [6 marks]

END OF QUESTIONS