University of Vavuniya

First Examination in Information Technology - 2020

First Semester - April/May 2022

IT1134 Fundamentals of Programming (Theory)

Answer Four Questions Only

Time Allowed : **Two hours**

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1. (a) Define what is meant by a **computer program** in your own words. [10%]

   (b) Briefly describe the functions of the following language translators:

   i. Interpreters

   ii. Compilers

   iii. Assemblers [15%]

   (c) Describe three properties of variables in C++. [15%]

   (d) Differentiate **run-time errors** and **syntax errors** in programming with the aid of suitable examples. [20%]

   (e) Describe the use of any five primitive (built-in) data types in C++. [20%]

   (f) Write C++ statements:

   i. to include the header files **iostream** and **string**.

   ii. to allow you to use **cin**, **cout**, and **endl** without the prefix **std::**.

   iii. to declare the following variables: **name** of type **string** and **studyHours** of type **double**.

[This question is continued on the next page]

iv. to prompt and input a string into **name** and a **double** value into **study-Hours**.

[20%]

2. (a) Compare and contrast **stack** and **heap** memory. [15%]

(b) Briefly describe the usage of the following **operators** by giving examples of each:

i. arithmetic

ii. assignment

iii. logical

[15%]

(c) State the use of the **shift** operator " >> " in C++. [10%]

(d) Trace the output of the following code snippet: [10%]

```
int a = 10;
a++;
cout<<"Initial value of a is:"<<a;
a<<2;
cout<<"Final value of a is :"<<a;
```

(e) Write an **algorithm** to read ten distinct numbers and find the **second smallest** among them. [15%]

(f) Draw a **flowchart** for the above algorithm in question 2.(e). [15%]

(g) Write C++ statements for the above algorithm in question 2.(e). [20%]

3. (a) Explain how an array is declared in C++ using a list of 10 integers. [15%]

(b) Compare and contrast the iterative statements **while** and **do while** . [10%]

(c) Write C++ statement(s) to find the **row sum** of an **n*m matrix** represented in a 2-dimensional array. [25%]

[This question is continued on the next page]

(d) Discuss the use of **pointers** in computer programming. [20%]

(e) Write C++ statements to **swap** the values of two variables using pointers. [30%]

4. (a) Describe the significance of user-defined **functions** in a computer program. [20%]

(b) Explain the concept of scope of an identifier with the aid of suitable examples. [15%]

(c) Describe the principal reason for **passing arguments by reference**. [10%]

(d) Write a function declaration and a function definition for a function that takes one argument of type **int** and one argument of type **double**, and returns a value of type **double** that is the average of the two arguments. [25%]

(e) Write an iterative function and a recursive function to display Fibonacci series of first n numbers. [30%]

5. (a) Explain how **structures** are different from **arrays** in programming. [20%]

(b) Write C++ statements to accomplish each of the following tasks:

i. Define a struct, **Student**, to store the following data about a Student: **First-Name(string)**, **LastName (String)**, **RegistrationNo(String)**, **YearOf-Study(int)**, and the **Course(string)**. [20%]

ii. Declare a **Student** variable and store the following information:
First Name: Adam,
Last Name: Bob,
Registration No: 2020IT01,
YearOfStudy: 1 and
Course: IT. [10%]

iii. Write a function to print **Student** information. [15%]

[This question is continued on the next page]

(c) Consider the following C++ code:

```
double salary = 78000;
double raise;
try
{ cout << "Enter the raise:  ";
cin >> raise;
cout << endl;
if ( raise < 0.0)
throw raise;
cout << "Salary increase:  $ "<< salary * raise / 100 << endl; }
cout << "Exiting the try block." << endl;
catch
{
cout << "Negative raise:  " << x << endl;
}
```

i. Find errors, if any, in the above code and provide the correct code. [15%]

ii. Find the output if the inputs are 5 and -4, after the correction of the code. [20%]