



The Open University of Sri Lanka
 B.Sc. Degree Programme: LEVEL 05
 Department of Mathematics and Computer Science
 Final Examination 2009/2010
CSU 3279 – OBJECT ORIENTED PROGRAMMING – Paper I
DURATION: Two and Half hours (2 ½ hours)

Date: 15/01/2010

Time: 9.30am – 12.00 Noon

Answer **FOUR** Questions Only

QUESTION 1

1.1) State whether the following statements are **True** or **False**.

- a) C++ is a pure object-oriented programming language.
- b) C++ has unsigned version of the data type '*int*'.
- c) The statement `cout << 'Hello there';` displays the message *Hello there* on the screen.
- d) `today-rainfall` is a valid C++ variable name.
- e) After execution of the following code segment, the value of the variable *sum* is 6.


```
int sum = 0;
for (int i=1; i<5; i++)
{
    i = i+1;
    sum += i;
}
```
- f) When you declare a function as `void myfunc (double=1.23, int=4);` it cannot be called as `myfunc (3);`.
- g) When you declare a static integer variable named '*p*' inside a function it cannot be used in the `main()` function.
- h) C++ '`break`' statement cannot be used to exit a loop before the test condition becomes false.



1.2) What C++ data types would you use to represent the following items?

- a) Gross income of Sri Lanka (in millions).
- b) Student's address stored in a student database.
- c) Number of invisible creatures in the earth.
- d) Height of a person.
- e) Outcome of a traffic light system.
- f) PH value of substance.
- g) Freezing value of water in Fahrenheit scale.

1.3) Write C++ assignment statements to evaluate the following equations:

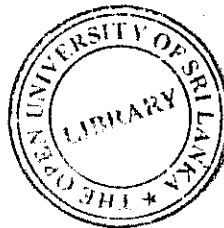
a) $Area = \pi r^2 + 2\pi rh$

b) $Torque = \frac{2m_1m_2}{m_1 + m_2} * g$

c) $Side = \sqrt{a^2 + b^2 - 2ab \cos(x)}$

d) $\mu = \mu_0 \frac{T_0 + C}{T + C} \left(\frac{T}{T_0} \right)^{3/2}$

e) $Energy = mass \left[acceleration * height + \frac{velocity^2}{2} \right]$



QUESTION 2

2.1) a) What is the special term used for the operation to change data type of an expression or a variable explicitly?

b) Two variables are defined as `double d = 38.4; int i = 35;`. Answer the following questions based on the values of those two variables.

- (i) what is the value of `d` when `d=i;`
- (ii) what is the value of `i` when `i=d;`
- (iii) what are the values of `i` and `d` when `i=++d;`
- (iv) what are the values of `i` and `d` when `d=i++;`

2.2) a) Explain the differences between *global* and *local* variables using example programs in C++. Clearly mark/bracket scope of those variables in your programs.

b) What is the symbol used to display value of global variable when you have a local variable with the same name.

- 2.3) Determine the value of each of the following logical expressions if $a = 5$, $b = 10$ and $c = -6$.
- $a > b \ \&\& \ a < c$
 - $a < b \ \&\& \ a > c$
 - $a == c \ || \ b > a$
 - $b > 15 \ \&\& \ c < 0 \ || \ a > 0$
 - $(a/2.0 == 0.0 \ \&\& \ b/2.0 != 0.0) \ || \ c < 0.0$
- 2.4) Write the syntax (method of use) of a FOR loop in C++. Using the syntax of FOR loop, write C++ program to print the following output.

```

1
2 2
3 3 3
4 4 4 4
5 5 5 5 5

```



QUESTION 3

- 3.1)
- Write three advantages of using *functions* in a C++ program.
 - Explain the purpose of default arguments in a C++ function.
 - Explain the difference between passing an argument *by value* and *by reference* in a C++ function.
- 3.2) Construct a suitable function prototype for the following descriptions (please provide a single line answer):
- square()* takes a *double* argument and returns a *double*.
 - sulee()* takes an *int* argument, a *char* argument that is assigned to a default value of character 'e' and does not return any value.
 - sumOfSquares()* takes the name of a *float* array and the size of the array as parameters and returns a double value.
 - readStudent()* takes a structure variable of the 'Student' structure and reads one student's information into this structure variable.
 - ptrFunc()* takes a pointer to an *int* and does not return a value.
- 3.3) Write C++ functions to perform the following tasks.
- readArray()* - Asks a group of integer values from a user and stores those numbers in an array.
 - sumArray()* - takes an array of integers and the size of the array as arguments and returns the sum of the elements of the array.
 - sumSquares()* - takes an array of integers and the size of the array as arguments and returns the sum of squares of the elements of the array.



QUESTION 4

- 4.1) Explain why structures are important in C++.
- 4.2) What is a *pointer variable* in C++? Explain how to create a dynamic array using *pointers*.
- 4.3) Write a *structure* template to hold the details of a book. It should include the title, author, no of pages, and the price of the book.
- 4.4) Write a C++ program to perform the following tasks using the structure defined in 4.3.
- To create a collection of books of arbitrary size given by the user.
 - To store the information of each book in this collection.
 - To search a book by its title.
 - To print the information of the whole collection of books.

QUESTION 5

- 5.1) Write short notes on the following
- If vs Switch*
 - For loop vs While loop*
 - Do-while loop vs While loop*
- 5.2)
- What is the purpose of using *break statement* and *continue statement* in a loop.
 - Write syntax diagrams for "*For loop*", "*While loop*" and "*Do-While loop*" and properly indicate using arrows what happens when *break* and *continue* statements are used within each of the above mentioned loops.
- 5.3) Understand how the numbers in the following sequence is calculated (these are called Fibonacci numbers)

0, 1, 1, 2, 3, 5, 8, 13, 21, ...

(Equation : *current no = previous number + number before previous number*.
First two numbers 0, 1 are fixed)

Write C++ code using a '*Do..While*' loop to calculate and print the first 10 Fibonacci numbers.

QUESTION 6

- 6.1) a) What are the advantage(s) of overloading *functions* in a programming language?
 b) How do you achieve function overloading in C++ ? Explain using an example.
 c) What is an *Inline function*? Give an example.
- 6.2) Write a C++ program using '*while*' loop to reverse the digits of a given number. For example, the number 12345 should be written as 54321.
 [Hint: Use modulus operator to extract the last digit and the integer division by 10 to get the n-1 digit number from the n digit number.]
- 6.3) The method of calculation for the unknown values X and Y is given below.
 (ad-cb is not equal to Zero)

$$X = \frac{md - bn}{ad - cb} \quad \text{and} \quad Y = \frac{na - mc}{ad - cb}$$

Using the above information, write a C++ program that reads the values of *a*, *b*, *c*, *d*, *m* and *n* and compute and print the values of *X* and *Y*.

- 6.4) A grade of a course is computed using the following conditions:

Marks Range	Grade
00 - 19	F
20 - 29	E
30 - 39	D
40 - 59	C
60 - 79	B
80 - 100	A



Write C++ statements to input the marks of a student and to find the grade of that student, using the '*switch*' statement. Use the values given in the table to find the grade.

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