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Second Semester MCA Degree Examination, June/July 2016

Object Oriented Programming using C++

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

1. a. Explain the role of default argument in functions. Find the output of the following program that uses default arguments in functions

```
#include < iostream.h >
int sum (int a = 1, int b = 2, int c = 3)
{
    Return (a+b+c) ;
}
void main ( )
{
    int a = 10, b = 20, c = 30 ;
    int x = sum (a, b, c) ;
    int y = sum (a, b) ;
    int z = sum (a, c) ;
    int x1 = sum (b, c) ;
    int y1 = sum (b) ;
    int z1 = sum ( ) ;
    cout << "x = " << x << "y = " << y << "z = " << z << endl;
    cout << "x1 = " << x1 << "y1 = " << y1 << "z1 = " << z1 << endl ;
}
```

(08 Marks)

- b. What are reference variables? Find the output of the following program.

(08 Marks)

```
#include < iostream.h >
int f1 (int &a, int b)
{
    b = a + b;
    a = b ;
    return (a)
}
void main ( )
{
    int x = 5 ;
    int & y = x;
    y = 10 ;
    x = x + y ;
    int z = f1 (x, y) ;
    cout << "x = " << x <<
        " y = " << y <<
        " z = " << z << endl ;
}
```

- c. Explain inline functions with an example.

(04 Marks)

2. a. Explain template functions. Write a template function to find the position of biggest element in an array of integers and characters. Write the main function to use the template function.

(08 Marks)

- b. Find the output of the following program

```
#include <iostream.h>
int x = 100;
void main ( )
{
for (int x = 1; x < 3 ; x++)
{
cout << x << endl ;
for (int x = 10 ; x < 20 ; x = x+5)
cout << x << " x <<"\t" ;
cout << endl ;
}
cout << x << endl ;
cout << :: x << endl ;
}
```

(04 Marks)

- c. Explain function overloading. Write overloading functions to find (i) area of a circle for a given radius (ii) area of a rectangle for given 2 sides (iii) area of a triangle for given 3 sides and write the required main function to involve the overloaded functions. (08 Marks)

- 3 a. Find the output of the following program

```
#include <iostream.h>
void main ( )
{
float a = 13.458, b = 123.0 ;
cout << "a = " << a << "b = " << b << endl ;
cout.precision(2) ;
cout << "a = " << a << " b = " << b << endl ;
cout.setf (ios :: showpoint) << "a = " << "b = " << b << endl ;
cout.setf (ios :: showpos) << "a = " << a << " b = " << b << endl ;
}
```

Rewrite the above program using manipulators for output operations. (08 Marks)

- b. Discuss exception handling in C++. Write a C++ program to handle square root of negative value in finding the area of a triangle when three sides are given. (08 Marks)
- c. Explain dynamic memory allocation and deallocation operation in C++. (04 Marks)

- 4 a. Discuss the characteristics of object oriented systems. (08 Marks)

- b. Write the syntax of class declaration in C++. Give a suitable example. Explain defining member functions inside the class and outside the class. (06 Marks)

- c. What are constructors and destructors? (06 Marks)

- 5 a. What is operator over loading? Declare a class TIME with data members hours and mins with member functions to read, print TIME objects and an overloaded operator + to add two TIME objects. Use the class TIME in a main function to read 2 TIME objects find the sum of 2 TIME objects and print all the TIME objects. (10 Marks)

- b. What are friendly functions? Define a class POINT with data members x, y and member functions to read and print POINT objects. Write a friendly function that finds the given POINT object is inside a circle of radius of 4 units centered at origin. Write the required main function to read a POINT object and to find it is inside the circle. (10 Marks)

- 6 a. How inheritance is achieved with classes in C++. Declare a base class rectangle with data members' length, breadth and member functions to read, print and compute area. Derive a subclass box from rectangle class with additional data member height and member function to find volume. Write the required main function to create an object box and find its volume through inheritance. (10 Marks)
- b. What is type conversion in C++? list the possible type conversions in C++. Write a C++ program to a class TIME with data members hours, mins. Write a conversion function using casting operator to convert a TIME object to an integer that represent total minutes of the TIME object (ie 1 hour 12 mins = 72 mins). Also write the necessary member function to read, print TIME object and main function. (10 Marks)
- 7 a. Explain function over riding. Why overriding is required in inheritance? (06 Marks)
- b. What are virtual and pure virtual functions? (06 Marks)
- c. Discuss static members and member functions. (08 Marks)
- 8 Write short notes on :
- a. Early and late binding
- b. Const and volatile qualifiers
- c. Access specifiers
- d. Types of inheritance. (20 Marks)

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