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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

May 2023 Semester End Main Examinations

Programme: B.E. **Semester: III**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 22IS3PCOOP **Max Marks: 100**
Course: Object oriented Programming using C++ **Date: 12.05.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

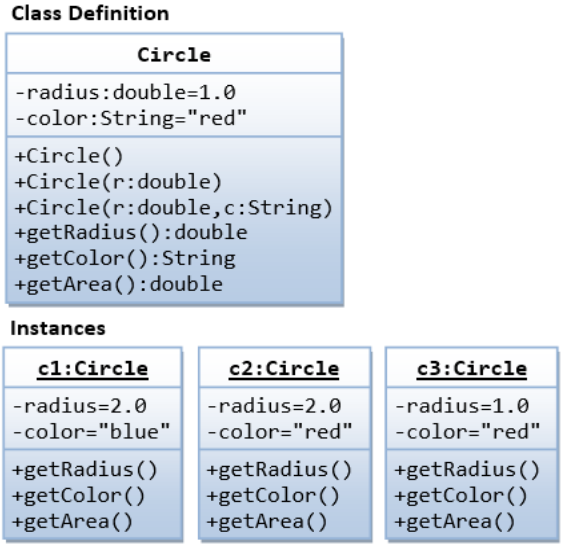
Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

UNIT - I

1 a) Illustrate the features of Object oriented programming. How it is different from procedure oriented programming? **06**

b) Create a class called Time that has separate int member data for hours, minutes, and seconds. One constructor should initialize this data to 0, and another should initialize it to fixed values. Another member function should display it, in 11:59:59 format. The final member function should add two objects of type time passed as arguments.
A main() program should create two initialized time objects (should they be const?) and one that isn't initialized. Then it should add the two initialized values together, leaving the result in the third time variable. Finally it should display the value of this third variable. Make appropriate member functions const. **08**

c) A class called Circle is to be defined as illustrated in the class diagram. It contains two data members: radius (of type double) and color (of type String); and three member functions: getRadius(), getColor(), and getArea().
Generate a code with three instances of Circles called c1, c2, and c3 with their respective data members, as shown in the instance diagrams. **06**



UNIT - II

2 a) What is a virtual function? Write rules for virtual function. Explain with example. **06**

b) A counter is a variable that counts things. Maybe it counts file accesses, or the number of times the user presses the Enter key, or the number of customers entering a bank. Each time such an event takes place, the counter is incremented (1 is added to it). The counter can also be accessed to find the current count. Write a program to implement the same. **08**

c) Predict the output and explain the concept used. **06**

```
#include <iostream>
using namespace std;
 int sum(int n1, int n2, int n3 = 2, int n4 = 2, int n5 = 2);
 int main() {
   cout << sum(1, 1, 1, 1, 1) << endl;
   cout << sum(1, 1, 1, 1) << endl;
   cout << sum(1, 1, 1) << endl;
   cout << sum(1, 1) << endl;
   cout << sum(1) << endl;
}
int sum(int n1, int n2, int n3, int n4, int n5) {
   return n1 + n2 + n3 + n4 + n5;
}
```

UNIT - III

3 a) Discuss the role of acess specifiers in inheritance and show their visibility when they are inherited as public, private and protected. **06**

b) Write a program that substitutes an overloaded += operator for the overloaded + operator. This operator should allow statements like s1 += s2; where s2 is added (concatenated) to s1 and the result is left in s1. The operator should also permit the results of the operation to be used in other calculations, as in
s3 = s1 += s2 **08**

c) Here are two declarators that describe ways to add two string objects: **06**
void add(String s1, String s2)
String operator + (String s)
Match the following from the first declarator with the appropriate selection from the second declarator.
function name (add) matches _____.
return value (type void) matches _____.
first argument (s1) matches _____.
second argument (s2) matches _____.
object of which function is a member matches _____.
a. argument (s)
b. object of which operator is a member
c. operator (+)
d. return value (type String)
e. no match for this item

OR

4 a) What are the rules for operator overloading in C++? **06**

b) Imagine a publishing company that markets both book and audiocassette versions of its works. Create a class Publication that stores the title (a string) and price (type float) of a publication. From this class derive two classes: Book, which adds a page count (type int), and Tape, which adds a playing time in minutes (type float). Each of these three classes should have a getdata() function to get its data from the user at the keyboard, and a putdata() function to display its data. Write a main() program to test the book and tape classes by creating instances of them, asking the user to fill in data with getdata(), and then displaying the data with putdata(). **08**

c) Predict the output and explain the concept used. **06**

```
# include <iostream>
using namespace std;
int value = 10;
namespace first {
        int value = 40;
        namespace second {
        int value = 20;
        }
}
int main() {
        int value = 30;
        cout << value << "\n";
        cout << first::value << "\n";
        cout << first::second::value << "\n";
        cout << ::value << "\n";
        return 0;
}
```

UNIT - IV

5 a) Explain the role of seekg(), seekp(), tellg(), tellp(), function in the process of random access in a file. **06**

b) Write a C++ Program to maintain Employee Database using Virtual class. Functions to be implemented are create, display, update. Employee details should contain Name, Emp-id, Salary and Experience. **08**

c) Explain pure virtual function and abstract classes. Create a pure virtual function, calculateArea () for class shape which acts as base class for circle and square. Print the area of the two shapes. **06**

OR

6 a) What is the use of this pointer in C++? Illustrate with example. **06**

b) Develop a program to read the data stored in two separate files and write the contents to the third file. **08**

c) Predict the output and Justify your answer. **06**

```
#include<iostream>
using namespace std;
class SmartPtr {
   int *ptr; public:
   explicit SmartPtr(int *p = NULL) { ptr = p; }

   ~SmartPtr() {
              delete(ptr);
   }
   int &operator *() {
              return *ptr;
             }
};
int main() {
   SmartPtr ptr(new int());
   *ptr = 20;
   cout << *ptr;
   return 0;
}
```

UNIT - V

7 a) Explain the Standard Template Library and how it is working. **06**

b) Write a C++ program to create a class template for illustrating stack of integers and print the total number of elements in the stack. **08**

c) Write a C++ program to accept user name and password and throw an exception if the password has less than 6 characters or does not contain a digit. **06**

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