(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 1449 Roll No. | | | | | | | | | | |

M.C.A.

(SEMESTER-IV) THEORY EXAMINATION, 2011-12

OBJECT ORIENTED SYSTEMS

Time : 3 Hours] *[Total Marks : 100*

Note : The question paper contains three sections, Section – **A**, Section – **B** and Section – **C** with the weightage of **20**, **30** and **50** marks respectively. Follow the instructions as given in each Section.

Section – A

1. This section contains 20 questions of multiple-choice. Attempt **all** parts of this section. **20 × 1 = 20**

(a) The address of a variable temp of type float is

(i) *temp

(ii) &temp

(iii) float& temp

(iv) float temp&

(b) What is the output of the following code ?

```
char symbol[3]={'a', 'b', 'c'};
for (int index=0; index <3; index++)
cout<<symbol[index];
```

(i) a b c

(ii) "abc"

(iii) abc

(iv) 'abc'

(c) The process of building new classes from existing one is called _____.

(i) Polymorphism

(ii) Structure

(iii) Inheritance

(iv) Cascading

(d) If a class C is derived from class B, which is derived from class A, all through public inheritance, then a class C member function can access

(i) protected and public data only in C and B

(ii) protected and public data only in C

(iii) private data in A and B

(iv) protected data in A and B

(e) If the variable count exceeds 100, a single statement that prints "Too many" is

(i) if (count<100) cout<<"Too many";

(ii) if(count>100) cout>>"Too many";

(iii) if (count>100) cout<<"Too many";

(iv) None of these

(f) Usually a pure virtual function

(i) has complete function body

(ii) will never be called

(iii) will be called only to delete an object

(iv) is defined only in derived class

(g) To perform stream I/O with disk files in C++, you should

(i) open and close files as in procedural languages

(ii) use classes derived from ios

(iii) use 'C' language library functions to read and write data

(iv) include the IOSTREAM.H header file

(h) Overloading the function operator

(i) requires a class with an overloaded operator.

(ii) requires a class with an overloaded [ ] operator.

(iii) allows you to create objects that act syntactically like functions.

(iv) usually make use of a constructor that takes arguments.

(i) If an array is declared as int a[4] = {3, 0, 1, 2}, then values assigned to a[0] and a[4] will be _____.

(i) 3, 2

(ii) 0, 2

(iii) 3, 0

(iv) 0, 4

(j) Mechanism of deriving a class from another derived class is known as _____.

(i) Polymorphism

(ii) Single Inheritance

(iii) Multilevel Inheritance

(iv) Message Passing

(k) Run Time Polymorphism is achieved by _____.

(i) friend function

(ii) virtual function

(iii) operator overloading

(iv) function overloading

(l) In C++, dynamic memory allocation is accomplished with the operator _____.

(i) new

(ii) this

(iii) malloc()

(iv) delete

(m) If we create a file by 'ifstream', then the default mode of the file is _____.

(i) ios :: out

(ii) ios :: in

(iii) ios : : app

(iv) ios :: binary

(n) A variable defined within a block is visible

(i) from the point of definition onward in the program

(ii) from the point of definition onward in the function

(iii) from the point of definition onward in the block

(iv) throughout the function

(o) Which of the following cannot be legitimately passed to a function ?

(i) A constant

(ii) A variable

(iii) A structure

(iv) A header file

(p) A property which is not true for classes is that they

(i) are removed from memory when not in use.

(ii) permit data to be hidden from other classes.

(iii) bring together all aspects of an entity in one place.

(iv) can closely model objects in the real world.

(q) The keyword friend does not appear in

(i) the class allowing access to another class.

(ii) the class desiring access to another class.

(iii) the private section of a class.

(iv) the public section of a class.

(r) The operator that cannot be overloaded is

(i) ++

(ii) ::

(iii) ( )

(iv) ~

(s) A struct is the same as a class except that

(i) there are no member functions

(ii) all members are public

(iii) it cannot be used in inheritance hierarchy

(iv) it does have a this pointer

(t) Additional information sent when an exception is thrown may be placed in

(i) the throw keyword

(ii) the function that caused the error

(iii) the catch block

(iv) an object of the exception class

Section – B

2. Attempt **all** parts of this Section : **10 × 3 = 30**

(a) Class diagram represents static relationships. Why ?

(b) What is the primary difference between structured analysis and object oriented analysis ?

(c) What is containership ? How does it differ from Inheritance ?

(d) What are the different aspects of system design that Object, Dynamic and Functional model address ?

(e) Distinguish between the term modelling and methodology.

(f) What is state diagram ? Differentiate between a simple state diagram and a nested state diagram with proper example.

(g) Define specialization. Explain how it is different from generalization ?

(h) Define Exception Handling. How it is handled in C++ ?

(i) Explain with example copy constructor and conversion constructor.

(j) How does inheritance influence the working of constructor and destructor ? Given the following set of definitions

```
Class X
{ };
Class Y : public X
{ };
Class Z : public Y
{ };
Z obj;
```

What order will the constructor and destructor be invoked ?

Section – C

3. Attempt any **five** of the following : **5 × 10 = 50**

(a) Name some UML diagrams which are part of UML structural diagram ? Construct a class diagram for the following :

An international airport requires a system to keep track of flight details for customers. For each flight the system needs to store the flight number, destination, departure time, departure gate, airline and flight cost. Some flights are direct flights, i.e. they fly non-stop to the destination and some fly via another airport to their destination. We will call these flights indirect flights. In this case the flight stops at an airport en route to its destination to refuel. In the case of indirect flights information regarding the transit airport must also be stored. The flight cost is calculated to be the cost charged by the airline per customer plus a percentage of this amount (the profit rate). In the case of indirect flights an additional levy must be added to this amount per customer in order to cover refueling levies at the transit airport. Furthermore, on some flights additional passengers can board the plane at the transit airport. The system needs to keep track of whether boarding will take place at the transit airport or not. The system also needs to store details of the aircraft used for a flight. The aircraft make, model and capacity (number of passengers that it can carry), must be stored for each aircraft.

(b) What is state-based testing ? Consider an example of a class 'Stack' with two operations – Push and Pop. The stack is based on the principle of LIFO and there are three states : empty, holding and full and four events, namely new, push, pop and destroy.

Draw a state chart diagram for the Stack class. Also design the test cases using the state chart diagram drawn.

(c) What is class template ? Write a C++ program to design a queue class which can be used to handle different types of data namely int, char.

(d) Consider a class Time which represents time. The class should have three fields for hours, minutes and seconds. It should have constructor to initialize the hours, minutes and seconds and a method printTime( ) to print the current time.

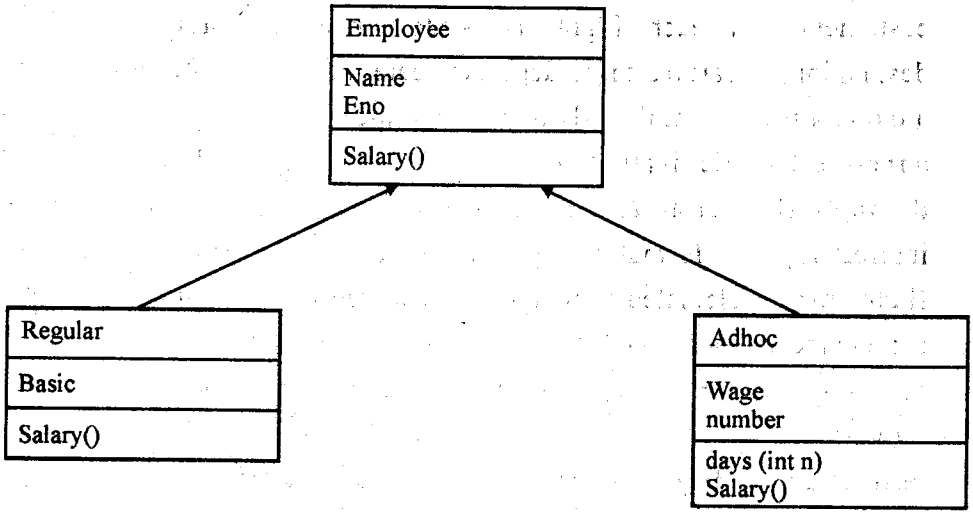
Write a C++ program to overload the following operators :

plus operator (+) (add two time objects based on 24 hour clock)

and <(compare two time objects)

(e) An organization has two types of employees -: Regular and Adhoc. Regular employees get a salary which is basic+DA+HRA, where DA is 10% of basic and HRA is 30% of basic. Adhoc employees are daily wagers who get a salary which is equal to number*wage. Write a C++ program to implement the following concepts :

(i) Define the classes shown in the following class hierarchy diagram.



(ii) Define the constructors. When a regular employee is created, basic must be a parameter. When adhoc employee is created wage must be a parameter.

(iii) Define the destructors.

(iv) Define the member functions for each class. The member function days( ) updates number of the Adhoc employee.

(f) Is it possible that a function is friend of two different classes ? If yes, then how it is implemented in C++ ?

(g) What is type conversion ? Write a C++ program for conversion from Basic type to User defined class type.

(h) Write short notes on :

(i) Aggression

(ii) Use Case Diagram

(iii) Stream