

Subject: **OBJECT ORIENTED PROGRAMMING WITH C++**
Time: 3 Hours

Max. Marks: 100

DECEMBER 2010

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after half an hour of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

- a. Who is the creator of C++?
- (A) Dennis Ritchie (B) Bjarne Stroustrup
(C) Ken Thompson (D) Ernest Tello
- b. Which of the following is not a valid statement regarding a C++ structure?
- (A) Structures cannot have functions.
(B) Access specifiers can be used with the members of a structure.
(C) Members of a structure are by default public.
(D) Structures can have heterogeneous data.
- c. Which of the following is a valid function declaration?
- (A) void fn(int [][], char *); (B) void fn(int a[][10][10], char *p);
(C) void fn(int a[][[]], char *p); (D) void fn(a[][10][10], *p);
- d. By default, objects are passed to functions
- (A) As constants (B) By value
(C) By reference (D) As individual members
- e. The return type of a constructor is
- (A) void (B) int
(C) void * (D) a constructor cannot have a return type
- f. When we write class A: public B, public C it means that
- (A) A is the base class (B) A, B and C are at the same level
(C) A is inherited from B and C (D) B and C are inherited from A
- g. Which of the following function template definitions is valid?
- (A) template <class A, B> void fun(A a, B b) { ... } (B) template <class A, class A> void fun(A a, A b) { ... }
(C) template <class A, typename B> void fun(A a, B b) { ... } (D) template <class A, class B> void fun(A a, B b) { ... }

- h. _____ Operator cannot be overloaded.
- (A) || (B) <<
(C) . (D) &
- i. Exception handling mechanism helps us to manage _____ errors in the programs.
- (A) Runtime (B) Syntax
(C) Compile time (D) None of these
- j. Which of the following class is the base of all the input/output stream hierarchy?
- (A) ios (B) iostream
(C) ostream (D) istream

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

- Q.2** a. Briefly explain the four main programming paradigms. (8)
- b. What do you understand by preprocessor and preprocessor directives? (4)
- c. What will be the output of the following code segments? (4)
- (i) `int i = 32;
i <<= 3;
cout << "\nAfter i <<= 3, i = " << i;
i >>= 6;
cout << "\nAfter i >>= 6, i = " << i;`
- (ii) `int i = 10, j = 5, k = 18;
cout << "i = " << i << " j = " << j << " k = " << k << endl;
++k = i++ + ++j;
cout << "i = " << i << " j = " << j << " k = " << k << endl;`
- Q.3** a. Write a program to print the n^{th} prime number. For example, if the user enters n as 4, then the program should display the output as 7. (8)
- b. What will be the output of the following code segments? (8)
- (i) `int n = 1234;
for (; n != 0; n = n/10){
cout << n%10;
n = n /10;
}`
- (ii) `int a = 10, b = 20;
if ((a < b) || (a = 5) > 10)
cout << "a = " << a;
else
cout << "b = " << b;`
- (iii) // Assume that the memory address of pi is 1000 and that of i is 1004
`int *pi, i;
pi = &i;`

```
*pi = 10;
cout << i << " " << &i << " " << *pi << " " << pi << " " << &pi <<endl;
i = 20;
cout << i << " " << &i << " " << *pi << " " << pi << " " << &pi
<<endl;
```

```
(iv) //Assume that a pointer occupies 4 bytes in memory
int *pi = new int [10];
float *pf = new float [20];
double *pd = new double [30];
cout << sizeof(pi) << " " << sizeof(pf) << " " << sizeof(pd);
```

- Q.4** a. Write a program to illustrate the following:-
 (i) Return-by-value (5)
 (ii) Return-by-reference (5)
- b. Compare inline functions and macros. (4)
- c. Define recursion. Explain its working. (4)
- d. Give the applications of function overloading. (3)
- Q.5** a. Design a class named Person, with name and address as private members. Here address is an object of class named Address with the private members: street, town, state, country and pincode. Define a suitable constructor of the Person class and a function displayPerson() to print the details of a person. (8)
- b. Explain how constructors differ from other member functions of a class. (4)
- c. Define *this* pointer. What are the restrictions on its usage? (4)
- Q.6** a. What do you understand by operator overloading? List atleast four restrictions for overloading operators. (6)
- b. Design and implement suitable class to support the following *main* function: (10)
- ```
int main() {
 complex a(3, 4);
 complex b = a;
 a = a + b;
 cout << a << b;
}
```
- Q.7** a. Briefly explain virtual base classes. Give its applications. (6)
- b. With the help of an example explain the difference between an IS-A and HAS-A relationship? (4)
- c. What will be the output of the following program? (6)
- ```
class A {
    int a;
```

```

public:
    A() { a = 0; cout << "\nIn A"; }
    A(int x){ a = x; cout << "\nIn A with a = " << a; }
    ~A() { cout << "\nDestroying A"; }
};

class B {
char b;
public:
    B() { b = 0; cout << "\nIn B"; }
    B(char x){b = x; cout << "\nIn B with b = " << b; }
    ~B() { cout << "\nDestroying B"; }
};

class C : public A, public B {
public:
    C(int i, char c) : B(c){ cout << "\nIn C with i = " << i; }
    ~C() { cout << "\nDestroying C"; }
};

int main() {
    C obj(10, 'z');
    return 0;
}

```

- Q.8** a. Write a template function that sorts the elements of the array passed to it as an argument. (6)
- b. When is the multiple *catch* statements used with a *try* block? What is the significance of *catch(...)*? (5)
- c. Explain namespace and unnamed namespace. Give an example for illustration. (5)
- Q.9** a. What are ios functions? Give the functionality of the following ios functions:
 (i) *width()* (ii) *fill()*
 (iii) *precision()* (iv) *setf()*
 Also mention the manipulators corresponding to these functions. (8)
- b. How is a vector container different from a list container? Write the program segment to create a vector having 10 integers, fill the vector with numbers from 1 to 10 and then display the contents of the vector. (8)