M.TECH/CSE/3RD SEM/CSEN 6142/2016

OBJECT ORIENTED PROGRAMMING
(CSEN 6142)

Time Allotted : 3 hrs **Full Marks : 70**

Figures out of the right margin indicate full marks.

Candidates are required to answer Group A and any 5 (five) from Group B to E, taking at least one from each group.

Candidates are required to give answer in their own words as far as practicable.

Group – A
(Multiple Choice Type Questions)

1. Choose the correct alternative for the following: **10 × 1 = 10**

(i) Which among following is correct way of declaring object of a class?
(a) classname Objectname
(b) class Classname Objectname
(c) class Classname object Objectname
(d) classname Object Objectname.

(ii) References are often confused with pointers in C++, which statement is not correct in this context?
(a) You cannot have NULL references but NULL pointer.
(b) Once a reference is initialized to an object, it cannot be changed to refer to another object.
(c) Pointers cannot point to another object of same type at any time
(d) All of above statements.

(iii) A function "intmultiply(int x, int y=5)" is defined to multiply two numbers. If you call the function by issuing statement int a = multiply (12) what will be the value of a?
(a) 12 (b) 0 (c) Runtime error (d) 60.

(iv) The failure of new operator to allocate requested memory space leads to which of the following exceptions being raised?
(a) Bad_allocation (b) bad_alloc
(c) null (d) null_alloc.

(v) While reading a file if end-of-file is encountered then function eof() returns
(a) 0 (b) -1 (c) Non-zero value(true) (d) 1.

(vi) Which of the following cannot be used with the keyword virtual?
(a) class (b) member functions
(c) constructor (d) destructor.

(vii) When is copy constructor called instead of the assignment operator?
(a) When instantiating one object and initializing it with values from another object
(b) When passing an object by value.
(c) When an object is returned from a function by value.
(d) All of the above options.

(viii) Which of the following is not a valid file opening mode?
(a) ios::app (b) ios::trunc
(c) ios::noreplace (d) ios::create.

(ix) Which of the following are provided in Standard Template Library?
(a) list (b) graph (c) stack (d) tree.

(x) In the code snippet you are copying object d to e :
CVector d (2,3); CVector e; e = d;
What method is called during copy operation?
(a) Copy constructor (b) Assignment Operator
(c) None of the above.

Group – B

2. (a) Create a class Student which has variables student_ name, roll_no, marks of three subjects and functions to accept and display student's information. Using concept of array of objects accepts 5 students' data and display the information of topper who scored highest mark in class.

(b) Give an example of a function prototype that uses default arguments.

(c) Define a class to represent a bank account with following members:
Data Members:
- Name of the depositor, Account Number, Type of account and Account Balance

Member functions:
- Appropriate setter and getter methods for each data member. Type of account can be either "SB" or "CA"
- Constructor to create bank account with user specified parameters.
- Deposit amount to the account
- Withdraw amount from the account after checking balance

- Display Name of the depositor, Account No and Balance.

In the main function create an account with Name of depositor = Ashish Saha, Account Number = 8650457, Account Type = SB. Then deposit 5000 to that account and withdraw 2000 from the same account. Now display the account details.

4 + 1 + 7 = 12

3. (a) Describe the mechanism of accessing data members and member functions in the following cases :
   (i) Inside the main function
   (ii) Inside a member function of the same class
   (iii) Inside a member function of another class

   (b) What do you mean by reference variable? Write proper syntax to declare reference variable. Suppose you have pairs of numbers in your program, and you want to be sure that the smaller one always precedes the larger one. Write a C++ program that calls a function order () which checks two numbers passed to it by reference and swaps the originals if the first is larger than the second.

6 + 6 = 12

Group – C

4. (a) You have a Time class with two data members: hours and min, both are int type. Write two code snippet to overload ++ both for prefix as well as postfix usage. This ++ operator will increase the min part only.

   (b) Design a class called Complex with following specification:
   (i) Data members: real and imaginary both type double and access level private
   (ii) Three constructors: Complex(), Complex(double) - consider imaginary as 0, Complex(double, double)

   Implement all three constructors. You must implement Complex (double) by providing initializers in the function heading (initialization list).
   If you create an object like Complex pi = 3.14159; which constructor will be used.

6 + 6 = 12

5. (a) Create a class QUEUE to implement queue data structure with constructors & destructors. Define suitable member functions for insertion & deletion of elements to & from the queue.

   (b) Write a program in C++ to do this by clearly specifying the overflow & underflow conditions. Use concept of dynamic memory allocation.

8 + 4 = 12

Group – D

6. (a) Create a base class Shape which stores two member variables length and breadth and member function displayArea() and calculateArea (). Derive two classes rectangle and triangle from the base class Shape. Using runtime polymorphism calculate areas of rectangle and right angled triangle.

   (b) You have created two base classes Base1 and Base2:
   - In Base1 no virtual keyword is used in destructor
   - In Base2 virtual keyword is used in destructor

   Now in main function you have written following code snippet for creating derive class and delete them

```
intmain() {
    Base1* b1p = new Derived1;      delete b1p;
    Base2* b2p = new Derived2;      delete b2p;
}
```

   Which destructor(s) is called during each delete operation? Which one is desirable? Explain the reason of desirable behaviour?

6 + 6 = 12

7. (a) Assume that a bank maintains two kinds of accounts for customers; one called as savings account and the other is current account. The savings account provides simple interest and withdrawal facilities. The current account provides no interest. Current account holders should also maintain a minimum balance and if the balance falls below this level, a service charge is imposed.

   Create a class ACCOUNT that stores customer name, account number and type of account. From this derive the classes CUR_ACC and SAV_ACC to make them more specific to their requirements. Include necessary member functions in order to achieve the following tasks:
   (i) Accept deposit from a customer and update the balance
   (ii) Display the balance
   (iii) Compute and deposit interest.
   (iv) Permit withdrawal and update balance
   (v) Check for minimum balance, impose penalty, if necessary and update the balance.

7 + 5 = 12

Group – E

8. (a) Create a class Student which has variables student_name, roll_no. Implement a program which will save Student objects into a file and retrieve objects from a file. Illustrate this flexibility by overloading insertion and extraction operators.

   (b) WAP in C++ that accepts a number and check whether it lies within the range 10 - 50. If it lies above or below the range then throw exceptions. If it lies within the range then call myterminate().

8 + 4 = 12

9. (a) Write a main function where you are creating an integer array of length 2000 and handling bad_alloc exception using std::exception class.

   (b) Write the signature of the what() function defined in standard exception class and explain meaning of different parts.

   (c) What happens if an exception is raised in constructor? Explain it with a suitable example.

4 + 4 + 4 = 12