

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 6515

K

Unique Paper Code : 2342571102

Name of the Paper : Programming Using C++

Name of the Course : B.A. (P) CS M/N.M. & B.Sc. (PS/MS) with CS

Semester : I – DSC

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt **all** questions from **Section-A**.
3. Attempt any **four** questions from **Section-B**.
4. Attempt all parts of a question together.

SECTION A

1. (a) What is a generic pointer? What is the difference between operators dereference operator '*' and '&' in context of pointers? (3)
(b) State *true* or *false*: (3)
 - i. A constructor can be called explicitly like a normal function.
 - ii. A constructor can be declared as 'static'.
 - iii. A constructor does not have a return type.

P.T.O.

- (c) Write the output of the following code fragment: (3)

```
#include <iostream>
using namespace std;
int main() {
    int x = 2;
    switch (x + 1) {
        case 1:
            cout << "One"<<endl;
        case 2:
            cout << "Two"<<endl;
        case 3:
            cout << "Three"<<endl;
        default:
            cout << "Invalid"<<endl;
    }
    cout << "Done";
    return 0;
}
```

- (d) Define inline function. Give any two situations where we cannot use inline function. (3)
- (e) Write a program in C++ using call by reference to increase the marks of a student by 5. Display marks before and after the function call. (3)
- (f) Explain the use of static data member in a class with the help of suitable example. (3)
- (g) Identify which of the following are valid C++ identifiers. Give reasons. (3)
- i. Stu_name
 - ii. @sum
 - iii. _count
 - iv. Marks1
 - v. Total%
 - vi. first.name
- (h) In what way a derived class can access the private members of its base class? Explain. (3)

- (i) What is a destructor function? Can destructors be overloaded? Explain. (1*3)
(j) Write a program using C++ to demonstrate function overloading and state whether it is early binding or late binding and why? (3)

SECTION B

2. (a) Write each step of the trace and find the output for the following recursive function: (5)

```
int bingo(int n) {  
    static int x = 0;  
    if (n > 0) {  
        x++;  
        return bingo(n - 1) + x;  
    }  
    return 0;  
}
```

- (b) Explain exception handling with suitable example in C++. (5)
(c) Write a C++ program to print the following pattern. Number of rows (say, n) should be taken as input from the user. (5)

```
A  
B C  
D E F  
G H I J  
and so on.
```

3. (a) Write a program in C++ that reads input from the user and writes it to a file. Then, read the contents of the file and display them on the console. (4)

- b) Consider the code below and answer the following questions- (4)

```
#include <iostream>  
using namespace std;  
class Base {  
public:  
    Base() { cout << "Base Constructor\n"; }  
    ~Base() { cout << "Base Destructor\n"; }  
};
```

```
class Derived : public Base {
public:
    Derived()      {      cout      <<      "Derived
Constructor\n"; }
    ~Derived()     {      cout      <<      "Derived
Destructor\n"; }
};
int main() {
    Derived obj;
    return 0;
}
```

- i. Write the output of the program.
- ii. Explain the sequence in which constructors and destructors are called in inheritance.

c) Consider the following code fragment: (1+3+3)

```
#include <iostream>
using namespace std;
class A {
public:
    int p;
    void getP() {
        cout << "Enter value of p = ";
        cin >> p;
    }
};
class B : public A {
public:
    int q;
    void getQ() {
        cout << "Enter value of q = ";
        cin >> q;
    }
};
```

```

class C : public B {
private:
    int r;
public:
    void getR() {
        cout << "Enter value of r = ";
        cin >> r;
    }
    void sum() {
        cout << "Sum = " << p + q + r;
    }
};

int main() {
    C obj;
    obj.getP();
    obj.getQ();
    obj.getR();
    obj.sum();
    return 0;
}

```

- i. What is the type of inheritance used in this program?
 - ii. What will be the output if $p = 2$, $q = 3$, and $r = 4$?
 - iii. Explain how data members are accessed in class C.
4. (a) Write a program in C++ with a base class shape with two data members length and breadth and virtual function area. Derive a class rectangle with public inheritance. Override the function area. Show how can you call the two area functions by using a single pointer to the base class? (5)
- (b) Enumerate any five characteristics of object-oriented programming paradigm. (5)
- Write a function in C++ that takes a number 'n' as input and returns its factorial if 'n' is an odd number, else the function should return 0. (5)
- (c)
5. (a) Explain the concept of nesting of member functions with the help of a C++ program. Does it have any benefit? Explain. (6+1+2)
- (b) Write a C++ program using a class named 'Array' to input an integer array and find the largest element. The class should have the following: (1+3+3)
 - i. A data member to store the array and its size.

- ii. A member function `inputArray()` to input elements into the array.
- iii. A member function `findLargest()` to find and display the largest element in the array.

6. (a) Write a program that defines a function template that does the following: (2*3)
- i. Accepts one int and one char type argument
 - ii. Accepts one int and one float type argument
 - iii. Accepts two float type arguments

- (b) Find and correct the errors in the following C++ code: (2*3)

i.

```
#include <iostream>
using namespace std;
class Student {
    int rollno;
    void show() {
        cout << "Roll No: " << rollno << endl;
    }
};
int main() {
    Student s;
    s.show();
    return 0;
}
```

ii.

```
#include <iostream>
using namespace std;
void display(int a = 10, int b);
int main() {
    display(5);
    return 0;
}
void display(int a, int b) {
    cout << a << " " << b;
}
```

- (c) Write the output of the following code:

(3)

```
#include <iostream>
using namespace std;

double division(int a, int b)
{
    if (b == 0)
    {
        throw "Division by zero exception!";
    }
    return (a / b);
}

int main()
{
    int x;
    try
    {
        x = division(50, 5);
        cout << x << endl;
        x = division(50, 0);
    }
    catch (const char* msg)
    {
        cout << msg << endl;
    }

    return 0;
}
```

7. Consider the following class:

(15)

```
class Employee
{
    .....
};
```

Declare data members empName, empID, and salary of appropriate data types for the class Employee. Define its member functions to perform the tasks mentioned below:

- i. Define default and parameterized constructors to initialize data members of the class Employee.
- ii. void input(): This function reads values for empName, empID, and salary from the user.
- iii. void increment(double amount): This function increases the salary by the given amount.
- iv. void deduct(double amount): This function decreases the salary by the given amount, only if (salary - amount) $\geq$ 10000; otherwise, display the message

“Unable to deduct, minimum salary should be ₹10000”.

- v. void display(): This function prints all details of a given employee object : employee name, ID, and salary.

Write a main() function to create Employee objects to illustrate the usage of the above functions.