[This question paper contains 4 printed pages.]

Your Roll No.....

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Sr. No. of Question Paper : 12860

Unique Paper Code : 2344001101

Name of the Paper : Programming Using C+

Name of the Course : **Generic Elective : I**

Semester : I

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. **Section-A** is compulsory.
3. Attempt any four Questions from **Section B**.
4. Parts of question must be answered together.

Section-A

1. (a) Explain dynamic initialization of a variable with a suitable example. **3**

   (b) Differentiate with the help of an example **6**
   - (i) Static and dynamic polymorphism.
   - (ii) Break and continue statement

   (c) Find out the error(s) in following code snippets after execution giving reasons: **10**

(i)
```
#include <iostream>
using namespace std;
int main()
{
    const int x = 50;
    x = 30;
     cout << x;
     return 0;
}
```

(ii)
```
#include <iostream>
using namespace std;
int fun(int x, int y)
{
    return x + y;
}
double fun(int x, int y)
{
    return x * y;
}
int main()
{
    cout << fun(5,10);
    return 0;
}
```

(iii)
```
#include <iostream>
using namespace std;

int main()
{
    ifstream file;
    file.open("data.txt");
    file << "Hello, World
    file.close();
    return 3;
}
```

(iv)
```
#include <iostream>
using namespace std;
int add(x, y)
{
    return x + y;
}

int main()
{
    int z = add(3, 4);
    cout << z;
    return 0;
}
```

(v)
```
#include <iostream>
using namespace std;
class Student
{
public:
    Student(int age, string course)
    {
        this->age = age;
        this->course = course;
    }
    void display()
    {
      cout << "Age: " << age << ", Course: "
<< course << endl;
    }
private:
    int age;
    string course;
};
int main()
{
    Student S1;
    S1.display();

    return 0;
}
```

(d) Convert the following recursive function to iterative version: **5**

```
int func(int n)
 {
    if (n <= 1)
        return n;
    return func(n - 1) + func(n - 2);
 }
```

(e) Write a C++ program to swap two numbers using function template. **6**

Section-B

2. (a) Write a C++ program to print the following pattern for n rows: **5**

```
*
* *
* * *
* * * *
```

(b) Which of the following identifiers are valid? Give reasons. **5**

(i) total_1
(ii) @value
(iii) _number
(iv) int
(v) EmployeeID

(c) Observe the code below and answer the question: **5**

```
class A {
public:
    A() { cout << "A Constructor\n"; }
    ~A() { cout << "A Destructor\n"; }
};
class B : public A {
public:
    B() { cout << "B Constructor\n"; }
    ~B() { cout << "B Destructor\n"; }
};
int main() {
    B obj;
}
```

(i) What will be the output?

(ii) Explain the order of constructor and destructor execution.

3. (a) Write a `while` loop to display perfect square up to 100. **5**

(b) Write the output of the following code fragment after execution: **5**

```
int i = 1, j = 2, r = 0;
do
{
   r = i + j;
   i++;
   if(i == 3)
        continue;
   cout << r << " ";
} while(i <= 5);
```

(c) Write a function `largest(int a, int b, int c)` that finds greatest of three given numbers. Write a main function that reads three integers `a, b, c` from the user and uses `largest` to print greatest of three numbers. **5**

4. (a) Write a C++ program to create a class `BankAccount` with member functions to `deposit, withdraw` and `display` balance. Define a default constructor for this class with 0 balance. Define functions to take input and display the `balance` of the customers (objects). **8**

(b) Write a C++ program that defines a template function `min` which accepts two parameters of any type and returns the minimum of the two values. Test the function with `int`, `float`, and `char` types. 7

5. (a) Write a program in C++ to create a class named `Calculator` with member functions `addition`, `subtraction`, `multiplication`, and `division`. Use objects of the class to perform arithmetic operations on two numbers. 8

(b) Describe the concept of 'nesting of member functions'. Explain with the help of a C++ program. 7

6. (a) Design a C++ program to demonstrate multilevel inheritance using the following classes: 10

`class School` (Base class) with attributes: `school_name` and `location`.

`class Grade` (Intermediate class): Inherits from `School` and adds attributes: `grade_name` and `teacher`.

`class Student` (derived class): inherits from `Grade` and adds attributes: `student_name` and `marks`.

Use parameterized constructors to initialize all the class attributes. Create an object of `Student`, and display details from all the classes: `School`, `Grade`, and `Student`.

(b) Write a C++ program to print factorial of a number using recursion. 5

7. (a) Write the output of the following code: 5

```
#include <iostream>
using namespace std;
int main()
{
   int a, b, r;
   a = 10;
   b = 0;
   try
     {
     if (b == 0)
        throw 0;
     r = a / b;
     cout << "Result = " << r << endl;
   }
  catch (int arg)
  {
     cout << "Exception Caught" << endl;
  }
  cout << "End of the Program";
  return 0;
}
```

(b) Write a program that reads a text file `check.txt` and prints the total number of integers in it. 6

(c) Is runtime polymorphism possible without inheritance? Justify your answer. 4