is question paper contains 10 printed pages]

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ame of the Paper : Programming Fundamentals Using C++

ame of the Course : B.A. (Prog.)/B.Sc.(P)/B.Sc. Maths. Sc.

emester : I

uration : 3 Hours Maximum Marks : 90

(Write your Roll No. on the top immediately on receipt of this question paper.)

Section A is compulsory.

Attempt any **4** (*four*) questions from **Section B.**

All parts of a question must be answered together.

Section A

1. (*a*) What are keywords in C++ ? Identify which of the following keywords are valid and which are invalid ? 3

(*i*) forEach

(*ii*) int

(*iii*) Publicly

(*iv*) if

(*v*) while

(*vi*) abc_123

P.T.O.

(b) List any *three* primitive data types with their respective sizes.

(c) Write a C++ function swapValues( ) that accepts arguments in the form of two integer pointers swaps the values of the integers without using a temporary variable.

(d) Write the output of the following C++ code :

```
#include <iostream>
using namespace std;
void modify(int *x) {
  *x = *x * 2;
}
int main( ) {
  int num = 5;
  modify(&num);
  cout << "Value of num: " << num <<.endl;
  return 0;
}
```

(e) Write a C++ program to check whether a number is even and odd.

(f) Find the output of the following C++ code :

```
#include <iostream>
using namespace std;
int main( ) {
```

```
int a = 20, b = 6;

int result1 = a / b * b + a % b;

bool result2 = (a == 20) && (b < 10);

int result3 = a++ + --b;

cout << "After result3 calculation; a = " << a << ", b = " << b << endl;

int result4 = 10 + 2 * 3 / 4 - 5;

cout << "Result 1: " << result1 << endl;

cout << "Result 2: " << result2 << endl;

cout << "Result 3: " << result3 << endl;

cout << "Result 4: " << result4 << endl;

return 0;

}
```

(g) Which of the following statements is true or false ? 3

(*i*) A class in C++ can have several constructors, but only one destructor.

(*ii*) In C++, members of a class are private by default.

(*iii*) In C++, an object is instance of a class.

(*h*) Differentiate between do-while loop and while loop. 3

(*i*) What are type modifiers ? List any *two* integer type modifiers in C++. 3

(*i*) Identify the error in the following Try-Catch block :

```
#include <iostream>
using namespace std;
void divide(int a, int b) {
  try {
    if (b == 0) {
      throw runtime_error("Error: Division by zero");
    }
    cout << "Result: " << a / b << endl;
  }
  catch (const runtime_error& e) {
    cout << "Caught exception: " << e.what( ) << endl;
  }
}
int main( ) {
  int num1 = 20, num2 = 0;
  divide(num1, num2);
  return 0;}
}
```

Section B

(a) Write a C++ program that takes a positive integer n and produces a rhombus of 1s. Sample output with n = 3 is shown below : 5

```
    1
  1 1 1
1 1 1 1 1
  1 1 1
    1
```

(b) What will be the output of the following program : 5

```
#include <iostream>
using namespace std;
int main( )
{
for (int i = 1; i <= 5; i++)
{
for (int j = 1; j <= i; j++)
{
if ((i + j) % 2 == 0)
cout << "X ";
```

```
else
cout << "O ";
}
cout << endl;
}
return 0;
}
```

(*c*) Find errors, if any, in the following C++ statements : 5

(*i*) cout<<"x="x;

(*ii*) m=5;//n=10;//s=m+n;

(*iii*) cin>>x;>>y;

(*iv*) cout<<\n"Name:"<<name;

(*v*) /*addition*/z=x+y;

3. (*a*) What is function overloading ? Why is it required ? 5

(*b*) Find errors, if any, in the following function prototypes : 5

(*i*) float average(x,y);

(*ii*) int mul(int a,b);

(*iii*) int display(...);

(*iv*) void Vect(int? &V int & size);

(*v*) void print(float data[],size=20);

(c) State if the following statements are true or false : 5

(i) In C++, a function must always return a value.

(ii) C++ supports function overloading, allowing multiple functions with the same name but different parameters.

(iii) Default arguments in C++ functions must always be placed at the beginning of the parameter list.

(iv) Functions in C++ can have both pass-by-value and pass-by-reference parameters.

(v) A function declared with the inline keyword is guaranteed to be inlined by the compiler.

(a) Define a class to represent a bank account. Include the following members : 5

Data Members : Name of the depositor, Account number, Type of Account and Balance amount in the account.

Member Functions : To assign initial values, To deposit an amount, To display name and balance.

(b) Give the C++ syntax to access data members (public and private) and member functions in the following cases : 5

(i) Inside main program

(ii) Inside member function of the same class.

(c) Complete the following C++ program to find maximum of two numbers using a function **maximum** : 5

```
#include <iostream>
using namespace std;
int maximum(int a, int b);
int main( )
{
int x = 10, y = 20;
int max = maximum(x, y);
cout << "The maximum value is: " << max << endl;
return 0;
}
int maximum(int a, int b)
{
...
}
```

5. (a) What is a constructor ? Explain *three* types of constructors we use in C++. 5

(b) Debug the following C++ code : 5

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

```
{
int width, height;
Rectangle(int w, int h)
{
width = w;
height = h;
}
void displayArea( )
{
cout << "Area: " << width * height << endl;
}
};
int main( )
{
Rectangle r(10, 20);
r.display Area( );
return 0;
}
```

Explain why does the code fail to compile or produce the expected output ?

(c) Distinguish between the following two C++ statements : 5

Time T2(T1);

Time T2=T1;

T1 and T2 are objects of Time class.

6. (a) Class D is derived from class B. The class D does not contain any data members of its own. Does the class D require constructors ? If yes, then why ? 5

(b) Write a C++ program, to create a library system using inheritance. The Book class holds common details like title and authir and has a method displayDetails( ). The PrintedBook and Ebook classes inherit from Book and add specific details like numberOfPages and fileSize. Each class has its own version of displayDetails( ) to show its unique information. In the main( ) function, we store objects of both printedBook and Ebook in an array of Book pointers and call displayDetails( ) on each object. 5

(c) What are different forms of inheritance ? Give an example for each. 5

7. Explain the following with examples : 15

(i) Polymorphism

(ii) Multidimensional Arrays in C++

(iii) Data Encapsulation.