

Unique Paper Code : 2344001101
Name of paper : Programming Using C++
Name of Course : B.Sc. (P) / B.Sc. Mathematical Sciences (GE)
Semester : III
Duration : 3 Hours
Maximum Marks : 90

Instructions for candidates :

1. Write your Roll No. on the top of the question paper.
2. **Section A** is compulsory.
3. Attempt any **Four** Questions From **Section B**.
4. Part of a question must be answered together.

Section A

1. (a) Explain the usefulness of preprocessor directive `#include<iostream>`. (3)
- (b) Differentiate between identifiers and keywords. Explain the naming conventions used for the identifiers in C++. (3)
- (c) Find out error(s) in following code snippets after execution: (3)

(i)

```
#include <iostream>
using namespace std;
void main()
{
    cout << "Hello, World!";
    return 0;
}
```

(ii)

```
#include <iostream>
using namespace std;
int add(x, y)
{
    return x + y;
}
int main()
{
    int z = add(3, 4);
    cout << z;
    return 0;
}
```

(iii)

```
#include <iostream>
using namespace std;
int main()
{
    const int x;
    x = 5;
    cout << x;
    return 0;
}
```

- }
(d) Write a program to generate and print the first n terms of Fibonacci series. (3)
(0, 1, 1, 2, 3, 5, 8, 13, 21,)

- (e) Write a function `leap_Year` that accepts number as year from the user (3)
and returns true if year is leap year and otherwise returns false.

- (f) Give the output of the following code fragment after execution: (3)

```
#include <iostream>
using namespace std;
void swap(int & a, int b)
{
    int temp = a;
    a = b;
    b = temp;
}
int main()
{
    int a = 9;
    int b = 5;
    int c = 2;
    swap(a, b);
    swap(b, c);
    cout << a << '\n' << b << '\n' << c;
    return 0;
}
```

- (g) Differentiate between copy constructor and assignment operator? State the (3)
consequences when we pass copy constructor as an argument to a function
by value.

- (h) Write logical expressions to represent each of the following conditions: (3)

- (i) Whether character `ch` is either lowercase or
uppercase.
- (ii) Number `num` is a multiple of both 3 and 5.
- (iii) Number `num` is not between 1 and 10.

- (i) Write short notes on followings: (6)

- (i) Function prototyping
- (ii) Encapsulation
- (iii) Reference variable

Section B

2. (a) Write a `for` loop to display perfect square upto 100. (2)

- (b) Write the output of the following code fragments after execution:

- (i) `#include <iostream>` (3)
`using namespace std;`
`int main()`
`{`
`for (int i = 0; i < 4; ++i)`
`{`
`switch (i)`
`{`
`case 0: cout << "0";`
`case 1: cout << "1"; break;`
`case 2: cout << "2";`
`default: cout << "D"; break;`
`}`
`}`
`return 0;`
`}`
- (ii) `#include <iostream>` (3)
`using namespace std;`
`void fun(int a, int b)`
`{`
`a = 200;`
`b = 100;`
`cout<<a<<" "<<b<<endl;`
`}`
`int main()`
`{`
`int a = 100, b = 200;`
`cout<<a<<" "<<b<<endl;`
`fun(a, a);`
`cout<<a<<" "<<b;`
`return 0;`
`}`
- (iii) `#include <iostream>` (3)
`using namespace std;`
`int main()`
`{`
`int x = 10;`
`if(x=0)`
`{`
`cout<<"x is zero"<<endl;`
`}`
`else`
`{`
`cout<<"x is not zero"<<endl;`
`cout<<"The square of n is "<<x*x;`
`}`
`return 0;`
`}`

- (c) Write a switch-case statement to print the day of the week based on the user input. (4)
3. (a) Explain the endl and setw manipulators with suitable examples. (4)
- (b) Write a C++ program to print the following pattern : (5)
- ```

1
1 2
1 2 3
1 2 3 4
1 2 3 4 5

```
- (c) Write a program in C++ to calculate the power of a number. Create a function in the program that takes two inputs: a base b and an exponent e, where e is a non-negative integer. The goal is to compute  $b^e$  (base raised to the power exponent) using recursion. (6)
4. (a) Write a program to create a class counter with: (5)
- A static data member count that keeps track of the number of objects created.
  - A static member function getCount () that returns the value of count.
- (b) Create a class Box in C++ having three data members: length, width and height. (2)
- Define a default constructor for this class. (2)
- Define appropriate functions to take input and display the volume of the objects of the class. (4)
- Create an object of this class and display its volume. (2)
5. (a) Assuming an array of 7 elements containing the following values: (4)
- ```
{0.2, 0.4, 0.95, 0.88, 0.56, 0.56, 0.7}
```
- Write a C++ program to convert these values in the same array to percentages like {20, 40, 95, 88, 56, 56, 70}. You must use a function named conv_Percent that should take the array as an input.
- (b) C++ is robust programming language. Justify your answer. Explain the different types of exceptions. (5)
- (c) Write a simple program that performs division. The program should handle division by zero errors. How would you implement exception handling in C++ to manage division by zero? Provide an example using try, catch, and throw. (6)
6. (a) Write C++ program to swap two numbers using function template. (4)
- (b) Co-relate between Array and Pointer? Write the general syntax for declaration of pointer variable. Demonstrate the declaration and initialization of pointer variable with an example. (5)

- (c) Write short notes on the followings: (6)
- (i) Virtual functions
 - (ii) this pointer
 - (iii) Generic Pointers
7. (a) State the importance of Polymorphism in C++? Differentiate between Compile Time Polymorphism and Run Time Polymorphism. (4)
- (b) Write a program that reads a text file `Test.txt` and prints the total number of vowels in it. (5)
- (c) Is run time polymorphism possible without Inheritance? Explain multiple and multilevel Inheritance with suitable examples. (6)