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| Name of Course | : Computer Science: Generic Elective Honours (CBCS) |
| Name of the Paper | : Introduction to Programming |
| Semester | : I |
| Year of Admission | : 2015, 2016, 2017, 2018 |

Duration: 3 Hours Maximum Marks: 75

**Instructions for Candidates**

1. All questions carry equal marks.
2. Attempt any four questions out of six.

1. What will be the output produced on execution of the following C++ code?

```
#include<iostream>
using namespace std;
int temp = 11, count = 10, result = 0;
int main()
{
    int i, count = 100;
    cout << "Count value is " << ++count << endl;
    cout << "Count value is " << count++ << endl;
    for (i = 10; i > 5; i--)
    {
        result += i;
    }
    cout << result << endl;
    result = count - temp % 7;
    cout << result;
    return 0;
}
```

Suggest appropriate data type for the following with suitable reasons:

- `Roll_number` of a student
- `AverageMarks` secured by a student
- Student `status` of Outstation (Y/N)
- `Year_of_Birth` of a student

Check the validity of the variable names with respect to the naming conventions of C++. Justify your answer.

- `@name`
- `Hello`

- `123_var`
- `my%age`
- `getch`
- `_rate`

Write a C++ function `reverseNumber()` that accepts an integer number and returns the reverse of that integer.

(For example, if the number is 456 then it returns 654)

2. Write a C++ function `removeDuplicates()` that accepts a one dimensional integer array as an argument and returns another integer array without any duplicates from the input array.

Note: While removing the duplicates, the final occurrence of the duplicate element must be retained in the resultant array.

( For example: if the integer array is [5, 6, 3, 5, 6] then it returns [3, 5, 6] )

Write a C++ function `maxminNo()` that accepts a two dimensional integer `array` and its `number_of_rows` and `number_of_columns` as an argument and returns the maximum and the minimum integer value in the input array.

(For example: if the integer array is [[1,2,3],[4,5,6],[17,8,9]], number_of_rows=3 and number_of_columns=3 then it returns Max=17, Min=1)

3. A ten-digit phone number, such as 2130568996, has three parts: a 3-digit area code (such as 213), a 3-digit exchange code (such as 056), and a 4-digit number (such as 8996). Write a code in C++ that uses a *structure* named `phone` to store these parts of the phone number separately. Declare and initialize a *structure* variable of type `phone`. Also write C++ statements to display the phone number.

Write a C++ program that creates a *structure* `Student` with the following data members: `rollno, name, mark1, mark2.` In the main function create two *structure* instances `s1, s2` and initialize their data members. Calculate the percentage of the marks secured by `s1` and `s2` respectively. Create another *structure* instance `s3` that has the same value as `s1` for its data members. Display the name and percentage of all the students.

A class `First` has private member `x`, protected member `y` and public member `z`. Another class `Second`, creates an object of the class `First`. Which of the following members `x, y, z` can the object of class `First` access and why?

4. Write logical expressions to represent each of the following conditions:

   a) `sharevalue` should be `5000` and above but less than `10000`.
   b) `hobbies` should be either `"Read"` or `"Paint"` or `"PlayGames"`.
   c) `course` is `"BA"` and `marks` should be greater than `90`.

Define two functions `csaCylinder()` and `volCylinder()` which accept `radius` and `height` as their arguments and return the `curvedSurfaceArea` and `volume` of the cylinder respectively. Invoke the functions in the `main()` and display the result.

**Note: (pi=3.14)**
**Curved Surface Area of the cylinder = 2 * pi * r * h**
**Volume of a cylinder = pi * $r^2$ * h**

Write a function `sum_series()` which accepts `n` as an argument and returns the sum of the first `n` terms of the following series:

S= 1 – 1/3 + 1/5 -1/7 + ……

5. Write a program in C++ to define an abstract class `Place` consisting of the following members: `area` (in square meters) and `capital` (city), a parameterized constructor and a pure virtual function `printData`().

The program also defines two more classes: `State` and `Union_Territory` inherited publicly the class `Place`.

Class `State` has a data member `CM_Name` (name of the chief minister of state).

Class `Union_Territory` has a data member `Governor_Name` (governor of the union territory).

Define parameterized constructors for both the classes `State` and `Union_Territory`.

Override `printData`() function for both the derived classes `State` and `Union_Territory`

Define `main()` function which creates instances of each class `State` and `Union_Territory` and displays the data of the objects.

6. Write a program in `C++` to count the number of uppercase and lowercase alphabets present in a text file *book.txt*. Also, the program must copy the uppercase and lowercase alphabets from *book.txt* to *upper.txt* and *lower.txt* respectively.

Write the value of the following expressions when x = 2, y = 4 and z = 6

- `x - y != z || y / x ^ 2 >= z`
- `x % y == z + !x * y / 2 - z`

Show step by step evaluation.