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| Name of Course | : **CBCS B.Sc. (H) Mathematics** |
| Unique Paper Code | : **32357503** |
| Name of Paper | : **DSE- I, C++ Programming** |
| Semester | : **V** |
| Duration | : **3 hours** |
| Maximum Marks | : **75 Marks** |

*Attempt any four questions. All questions carry equal marks.*

**1.** Write a function, *printgrid*, that takes two parameters, (one parameter is a two-dimensional array and the second parameter is for the number of rows) and print the following grid structure using repetition and controlled statements. After that call the function, *printgrid*, in the main program.

```
#
 #  #
 #  1#
 #  1  2  #
 #  1  2  3  #
 #  1  2  3  4  #
 #  1  2  3  4  5  #
 #  1  2  3  4  5  6  #
 #  1  2  3  4  5  6  7  #
 #  #  #  #  #  #  #  #  #  #
```

**2.** Write a function in C++ using the one dimensional array to calculate the following quantity:

$$\sqrt{\frac{|\sum_{i=1}^{n}(x_i - \bar{x})^3|}{n(n-1)}}$$

where,
$x_i$ denotes the data stored in the cells of array
$\bar{x}$ denotes the average of the data stored in the array
$n$ denotes the number of data stored in the array and $n > 1$

**3.** Write a program to find the inverse of a $3 \times 3$ matrix over the field $Z_{23}$ entered by the user, if the determinant of the matrix is non-zero. The program also finds the sum of the square of the diagonal elements under modulo 23 of the inverse of the given matrix.

**4.** Write a program which finds the solution of the following system of equations by matrix inversion method.

$$2x + y + 2z = 0,$$
$$2x - y + z = 10,$$
$$x + 3y - z = 5.$$

**5.** Find the all errors of given program

```
            #include<iostream>;
             Using Namespace Std :
void Swap(int *x, int *y):
Intmain()
                {
        Int a, b, d;
                  a = 4;
                  b = 2;
        c = c + a;
        j = 1:
        for(k = 1; k<=n, k++)
                    {
cout<<setw(4)<< j;
                j = j + 3
        d = d +Pow(k, 2);
        cout<<"the Value of l in the" <<k<<"th iteration is  "<<l<<Endl;
                     }
        Double p;
        p = Sqrt{c, 3};
        cout<<p<<endl;
        Cout<<"Square root of "<< c<< "is  "<<p<<Endl;
int x = 5; y = 10;
cout<< "Before swap, x: " << x << " y: " << y <<Endl;
swap(&x, &y);
Cout<< "Main. After swap, x: " << x << " y: " << y <<Endl;
                  Return 0:
                }
      void swap (int *px, int *py)
            {
      int temp;
      cout<< "Swap. Before swap, *px: " << *px<<" *py: " << *py<<endl;
      temp = *pX
               *pX = *pY
               *pY = temp
      cout<< "Swap. After swap, *px: " << *px<<" *py: " << *py<<endl;
            }
```

Write the correct program of part (a)

Write the equivalent programs by using **while** and **do... while** loops.

**6.** There are 20 students in a class. Write an appropriate code in C++ using arrays to generate the Internal Assessment Marks of a particular paper based on the following information:

i. Maximum Marks of the paper=100
ii. Roll Number, Student Name, Test Marks, Assignment Marks and Attendance Percentage are stored in arrays.
iii. Maximum Marks for Test = 10% of Maximum Marks of the paper
Maximum Marks for Assignment = 10% of Maximum Marks of the paper
Maximum Marks for Attendance = 5% of Maximum Marks of the paper

**Attendance Marks** based on Attendance percentage is given in following table:

| | |
|---|---|
| 67 % ≤ Attendance < 70 % | 1 % of Maximum Marks for Attendance |
| 70 % ≤ Attendance < 75 % | 2 % of Maximum Marks for Attendance |
| 75 % ≤ Attendance < 80 % | 3 % of Maximum Marks for Attendance |
| 80 % ≤ Attendance < 85 % | 4 % of Maximum Marks for Attendance |
| 85 ≤ Attendance | 5 % of Maximum Marks for Attendance |

iv. Internal Assessment Marks = Test Marks + Assignment Marks + Attendance Marks
Print the following details for each student-

| Roll Number | Student Name | Test Marks | Assignment Marks | Attendance Marks | Internal Assessment Marks |
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