Date -
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PRACTICAL 8

- **Objective:** To write a C++ program for finding the inverse of a system of linear equations using Gauss Jordan method.

- **Algorithm:**

1. Start
2. Read Order of Matrix (n).
3. Read Matrix (A) of Order (n).
4. Augment and Identity Matrix of Order n to Matrix A.
5. Apply Gauss Jordan Elimination on Augmented Matrix (A).
6. Perform Row Operations to Convert the Principal Diagonal to 1.
7. Display the Inverse Matrix.
8. Stop.

- **Practical Code:**

```
#include<iostream>
#include<iomanip>
#include<math.h>
#include<stdlib.h>
#define SIZE 10
using namespace std;

int main() {
   float a[SIZE][SIZE], x[SIZE], ratio;
   int i,j,k,n;
   cout<< setprecision(3)<< fixed;
   cout<<"Enter order of matrix: ";
   cin>>n;
   cout<<"Enter coefficients of Matrix: " << endl;
   for(i=1;i<=n;i++) {
      for(j=1;j<=n;j++) {
         cout<<"a["<< i<<"]["<< j<<"]= ";
         cin>>a[i][j];
      }
   }
   cout<< endl<<"\n\nGiven Matrix is:"<< endl;
   for(i=1;i<=n;i++) {
      for(j=1;j<=n;j++) cout<< a[i][j]<<"\t";
      cout<< endl;
   }
   for(i=1;i<=n;i++) {
      for(j=1;j<=n;j++) {
         if(i==j) a[i][j+n] = 1;
         else a[i][j+n] = 0;
      }
```

```
    }

    for(i=1;i<=n;i++) {
       if(a[i][i] == 0.0) {
          cout<<"Mathematical Error!";
          exit(0);
       }
            for(j=1;j<=n;j++) {
               if(i!=j) {
             ratio = a[j][i]/a[i][i];
                  for(k=1;k<=2*n;k++) a[j][k] = a[j][k] - ratio*a[i][k];
                    }
            }
    }
    for(i=1;i<=n;i++) {
       for(j=n+1;j<=2*n;j++) a[i][j] = a[i][j]/a[i][i];
    }
    cout<< endl<<"Inverse Matrix is:"<< endl;
    for(i=1;i<=n;i++) {
       for(j=n+1;j<=2*n;j++) cout<< a[i][j]<<"\t";
            cout<< endl;
    }
    return(0);
}
```

- **Output:**

```
Enter order of matrix: 2
Enter coefficients of Matrix:
a[1][1]= 1
a[1][2]= 2
a[2][1]= 3
a[2][2]= 4
Given Matrix is:
1.000  2.000
3.000  4.000

Inverse Matrix is:
-2.000 1.000
1.500  -0.500
```

- **Application:**

a. Used for system of linear equations.