LAB ASSIGNMENT – 2

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COURSE CODE	MAT2002
COURSE NAME	APPLICATIONS OF DIFFERENTIAL AND DIFFERENCE EQUATIONS
SLOT	L1+L2
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EXPERIMENT 2(A): EIGENVALUES & EIGENVECTORS OF GIVEN MATRIX

MATLAB CODE:-

```
A=[3 0 -1;  0 1 0; 2 0 0]
Eigenvalues_of_A=eig(A)
[X,D]= eig(A)
p=poly(A)
r = roots(p)
sum_of_eigenvalues=sum(r)
Trace_of_A=trace(A)
product_of_eigenvalues_A=prod(r)
Determinant_of_A =det(A)
Inverse_A=inv(A)
Eigenvalues_of_invA= eig(Inverse_A)
Eigenvalues_Transpose_of_A= eig(A')
Eigenvalues of B= eig(A^2+3*A+2*eye(3))
```

OUTPUT:-

```
mmand Window
A =

     3     0    -1
     0     1     0
     2     0     0


Eigenvalues_of_A =

     2
     1
     1


X =

    0.7071    0.4472         0
         0         0    1.0000
    0.7071    0.8944         0


D =

     2     0     0
     0     1     0
     0     0     1
```

```
mmand Window
p =

     1    -4     5    -2


r =

   2.0000 + 0.0000i
   1.0000 + 0.0000i
   1.0000 - 0.0000i


sum_of_eigenvalues =

    4.0000


Trace_of_A =

     4


product_of_eigenvalues_A =

    2.0000


Determinant_of_A =

     2
```

```
mmand Window
Inverse_A =

         0         0    0.5000
         0    1.0000         0
   -1.0000         0    1.5000


Eigenvalues_of_invA =

    0.5000
    1.0000
    1.0000


Eigenvalues_Transpose_of_A =

     2
     1
     1


Eigenvalues_of_B =

    12
     6
     6
```

EXPERIMENT 2(B): DIAGONALIZATION BY SIMILARITY TRANSFORMATION

MATLAB CODE:-

```
clc
clear
A=input('Enter the marix for diagonalization:');
[P D]=eig(A);
disp('Given Matrix (A):')
disp(A)
disp('Modal Matrix (P):')
disp(P)
disp('Inverse of P:')
PI=inv(P);
disp(PI)
disp('Diagonal Matrix (D=P^(-1)*A*P):')
DM=round(inv(P)*A*P,2);
disp(DM)
```

INPUT:-

```
Command Window
  Enter the marix for diagonalization:[2 2 -7;2 1 2;0 1 -3]
```

OUTPUT:-

```
Command Window
  Given Matrix (A):
       2     2    -7
       2     1     2
       0     1    -3

  Modal Matrix (P):
     -0.6350    0.2357    0.7276
     -0.7620   -0.9428   -0.4851
     -0.1270   -0.2357    0.4851

  Inverse of P:
     -1.1249   -0.5624    1.1249
      0.8485   -0.4243   -1.6971
      0.1178   -0.3534    1.5314

  Diagonal Matrix (D=p^(-1)*A*P):
       3     0     0
       0     1     0
       0     0    -4
```

EXPERIMENT 2(B): DIAGONALIZATION BY ORTHOGONAL TRANSFORMATION

MATLAB CODE:-

```
clc
clear
A=input('Enter the marix for diagonalization:');
[P D]=eig(A);
disp('Given Matrix (A):')
disp(A)
disp('Modal Matrix (P):')
disp(P)
NP=normc(P);
disp('Normalized Modal Matrix (N):')
disp(NP)
disp('Diagonal Matrix (D=N^T*A*N:')
DM=round(NP'*A*NP,2);
disp(DM)
```

INPUT:-

```
Command Window
Enter the marix for diagonalization:[2 0 4;0 6 0;4 0 2]
```

OUTPUT:-

```
Command Window
Given Matrix (A):
     2     0     4
     0     6     0
     4     0     2

Modal Matrix (P):
    0.7071    0.7071         0
         0         0   -1.0000
   -0.7071    0.7071         0

Normalized Modal Matrix (N):
    0.7071    0.7071         0
         0         0   -1.0000
   -0.7071    0.7071         0

Diagonal Matrix (D=N^T*A*N:
    -2     0     0
     0     6     0
     0     0     6
```