GALGOTIAS COLLEGE OF ENGINEERING AND TECHNOLOGY

1, Knowledge Park-II, Greater Noida, U.P.

ASSINGNMENT-1 (matrices)

Prob1:- Find the inverse of the following matrices by using elementary transformation.

(i) $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$, (ii) $\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, (iii) $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$, (iv) $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$

Prob2:- Find two non singular martices p and Q from the following matrices .also find A^{-1} if possible.

(i) $A=\begin{bmatrix} 2 & 1 & -3 & -6 \\ 3 & -3 & 1 & 2 \\ 1 & 1 & 1 & 2 \end{bmatrix}$, (ii) $A=\begin{bmatrix} 3 & -3 & 4 \\ 2 & -3 & 4 \\ 0 & -1 & 1 \end{bmatrix}$, (iii) $A=\begin{bmatrix} 1 & -3 & 1 & 2 \\ 0 & 1 & 2 & 3 \\ 3 & 4 & 1 & -2 \end{bmatrix}$

Prob3:- Find the value of λ,for which the equations.

(i) $x+(\lambda+4)y+(4\lambda+2)z=0, x+2(\lambda+1)y+(3\lambda+4)z=0, 2x+3\lambda y+(3\lambda+4)z=0.$ have a non trivial solution .also find the solution in each case.

Prob4:- . Examine the consistency of the following system of equations, if consistent solve them.

(i) $3x+3y+2z=1, x+2y=4, 10y+3z=-2, 2x-3y-z=5.$

(ii) $x+2y-z=3, 3x-y+2z=1, 2x-2y+3z=2, x-y+z=-1.$

(iii) $x+2y-z=3, 3x-y+2z=1, 2x-2y+3z=2, x-y+z=-1.$

Prob5:- . Determine the values of λ, μ, the following system of equations $3x-2y+z=\mu, 5x-8y+9z=3, 2x+y+\lambda z=-1$ has (i) Unique solution, (ii) no solution, (iii) Infinite many solutions.

Prob6:- . Show that the equations $-2x+y+z=a, x-2y+z=b, x+y-2z=c$ have no solution unless $a+b+c=0$, in which case they have infinitely many solutions. Find these solutions when $a=1, b=1, c=1.$

Prob7:- Examine for linear dependency of vectors $(1,2,4),(2,-1,3),(0,1,2),(-3,7,2)$ in R^3. If they are linearly dependent, find the relation.

Prob8:- Examine for linear dependency of vectors $(1,1,0),(3,1,3),(5,3,3)$ in R^3. If they are linearly Dependent , find the relation.

Prob9:- Find the Eigen values and corresponding eigenvectors of the following matrices:

(i) $\begin{bmatrix} 2 & 0 & 0 \\ 1 & 0 & 2 \\ 0 & 0 & 3 \end{bmatrix}$, (ii) $\begin{bmatrix} -2 & 1 & 0 \\ 1 & 3 & 0 \\ 0 & 0 & -1 \end{bmatrix}$,(iii) $\begin{bmatrix} -14 & 1 & 0 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$, (iv) $\begin{bmatrix} 3 & 0 & 0 \\ 1 & -2 & -8 \\ 0 & -5 & 1 \end{bmatrix}$ (v) $\begin{bmatrix} 1 & -2 & 0 \\ 0 & 0 & 0 \\ -5 & 0 & 7 \end{bmatrix}$

Prob10:- . Verify Caley –Hamilton theorem for all the following matrices. And find A^{-1}.

(v) $\begin{bmatrix} 1 & -2 & 0 \\ 0 & 0 & 0 \\ -5 & 0 & 7 \end{bmatrix}$ (vi) $\begin{bmatrix} 3 & 0 & 0 \\ 1 & -2 & -8 \\ 0 & -5 & 1 \end{bmatrix}$, (vii) $\begin{bmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -4 & -3 \end{bmatrix}$.

Prob11:- Find the matrix A whose Eigen values are 1,1,3 and corresponding eigenvectors are

$(1,0,-1)',(0,1,-1)',(1,1,0)'$ Respectively.

Prob12:- Find the matrix A whose Eigen values are 11,-1,2 and corresponding eigenvectors are

$(1,1,0)',(1,0,1)',(3,1,1)'$ respectively.

Prob13:-Reduce the following matrices in to the diagonal matrix .if possible

(i) $\begin{bmatrix} 4 & 1 \\ 2 & 3 \end{bmatrix}$ (ii) $\begin{bmatrix} 2 & 0 & 0 \\ 1 & 0 & 2 \\ 0 & 0 & 3 \end{bmatrix}$ (iii)) $\begin{bmatrix} 3 & 0 & 0 \\ 1 & -2 & -8 \\ 0 & -5 & 1 \end{bmatrix}$

Prob14:- Find the characteristic equation and characteristic roots of the matrix $\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ and verify cayley Hamilton theorem for this matrix. Find A^{-1} and also express $A^6-4A^5+8A^4-12A^3+14A^2$ as a linear polynomial in A.

Prob15:- Find the rank of the following matrices by Echelon form and normal form method.

(i) $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$, (ii) $\begin{bmatrix} 1 & 2 & 5 \\ 2 & 3 & 1 \\ -1 & 1 & 1 \end{bmatrix}$.