Maharaja Agrasen Institute of Technology, Delhi

Department of Applied Sciences

SEM I ASSIGNMENT 3

Subject Name: Applied Mathematics-1
Subject Code: BS-111
Class: All first year groups

Assignment No	Date Given	Due Date	Mode of Submission	Total Marks	COs mapped
			Hard copy		CO3

Q1. Find out the rank of the matrix by bringing it to Echelon form

$$A=\begin{bmatrix}1 & -3 & 1 & 2\\ 0 & 1 & 2 & 3\\ 3 & 4 & 1 & -2\end{bmatrix}$$

Q2. Reduce the following matrix into normal form and find its rank.

$$A=\begin{bmatrix}5 & 3 & 14 & 4\\ 0 & 1 & 2 & 1\\ 1 & -4 & 2 & 0\end{bmatrix}$$

$$B=\begin{bmatrix}1 & 2 & 1 & 0\\ -2 & 4 & 3 & 0\\ 1 & 0 & 2 & -8\end{bmatrix}$$

Q3. Find the inverse of the matrix using elementary transformations.

$$A=\begin{bmatrix}3 & -3 & 4\\ 2 & -3 & 4\\ 0 & -1 & 1\end{bmatrix} \qquad B=\begin{bmatrix}2 & 3 & 4\\ 4 & 3 & 1\\ 1 & 2 & 4\end{bmatrix}$$

Q4 Investigate for what values of λ and μ do the equations $x+y+z=6,\ x+2y+3z=1,\ x+2y+\lambda z=\mu$ have (a)no solution (b) unique solution (c) infinite solution?

Q5. Find the values of k for which the system of equations $(3k-8)x+3y+3z=0,\ 3x+(3k-8)y+3z=0,\ 3x+3y+(3k-8)z=0$ has non trivial solution.

Q6. Find the eigen values and eigen vectors of the matrix

a) $\begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}$ b) $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ c) $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$

Q7. Verify CHT for the matrix A = $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$ and find its inverse. Also evaluate $A^6 - 6A^5 + 9A^4 - 2A^3 - 12A^2 + 23A - 9I$

Q8. Check whether the following vectors are linearly dependent or linearly independent $X_1 = (1,-1,1),\ X_2 = (2,1,1),\ X_3 = (3,0,2)$ are linearly dependent. Find the relation between them.

Q9. Check whether the following vectors are linearly dependent or linearly independent $X_1 = (3,1,1),\ X_2=(2,0,1),\ X_3 = (4,2,1)$ are linearly dependent.

Q10 Reduce the matrix to diagonal form . A= $\begin{bmatrix} 1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$

Q11. Test the consistency and hence solve the system of equations 3x+2y+2z=1, x+2y=4, 10y+3z=-2,2x-3y-z=5.

Q12. Find the coefficient matrix for the following quadratic form and hence find the nature of the form $3x^2+3y^2+3z^2+2xy+2xz-2yz$