SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN (AUTONOMOUS)
(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)
Chromepet, Chennai — 600 044.
B.Sc. END SEMESTER EXAMINATIONS APRIL-2022
SEMESTER - II
20USTCT2004 - Matrix Algebra

Total Duration : 3 Hrs. **Total Marks : 60**

Section A

Answer any **SIX** questions $(6 \times 5 = 30$ Marks)

1. Given A=$\begin{bmatrix} -3 & 6 \\ 0 & -9 \end{bmatrix}$ and A^T is it transpose matrix.
   Find (i) $2A + 3A^T$ (ii) $2A^T$ - 3A
2. Solve the matrix by determinant method : $\begin{bmatrix} 2 & 4 \\ 5 & 1 \end{bmatrix} = \begin{bmatrix} 2x & 4 \\ 6 & x \end{bmatrix}$
3. Show that the following equations are inconsistent:x + y + z = -3;
   3x + y - 2z = -2 ; 2x + 4y - 7z = 7.
4. Write the properties of Eigen roots.
5. Show that the linear transformation $y_1 = 2x_1 + x_2 + +x_3$;
   $y_2 = x_1 + x_2 + 2x_3$; $y_3 = x_1$ - $2x_3$. Write down the inverse transformation.
6. Explain the various types of matrix.
7. For what value of x the matrix A=$\begin{bmatrix} 1 & -2 & 3 \\ 1 & 2 & 1 \\ x & 2 & -3 \end{bmatrix}$ is singular?
8. Determine the matrix , index and signature of the quadratic form
   $x_1^2 + 2x_2^2 + 3x_3^2 + 2x_2\ x_3$ - $2x_3\ x_1 + 2x_1\ x_2$.

Section B

Answer any **THREE** questions $(3 \times 10 = 30$ Marks)

9. Find the addition and multiplication of matrix A=$\begin{bmatrix} 4 & 3 & 2 \\ 5 & 6 & 3 \\ 3 & 5 & 2 \end{bmatrix}$ and B=$\begin{bmatrix} 3 & -4 & 3 \\ 1 & -2 & 2 \\ -7 & 11 & -9 \end{bmatrix}$
10. Solve by matrix inversion method x + y + z = 8;
    x - y + 2z = 6; 3x + 5y - 7z = 14.
11. Show that the following system of equations using Cramer rule:
    x + 2y + 3z = -5; 3x + y - 3z = 4; -3x + 4y + 7z = -7.
12. State and prove Cayley-Hamilton theorem.
13. Solve by reducation of quadratic form to canonical form:
    Q = $6x^2 + 3y^2 + 3z^2$ - 4xy - 2yz + 4zx.

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