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.(Stats) - END SEMESTER EXAMINATIONS APRIL-2023
SEMESTER - II
20USTCT2004 - Matrix Algebra

Total Duration : 2 Hrs 30 Mins. Total Marks : 60

Section B

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

1. Find X and Y if 2X + Y = $\begin{pmatrix} 4 & 4 & 7 \\ 7 & 3 & 4 \end{pmatrix}$ and X - 2Y = $\begin{pmatrix} -3 & 2 & 1 \\ 1 & -1 & 2 \end{pmatrix}$

2. If A = $\begin{pmatrix} 3 & 4 \\ 1 & 1 \\ 2 & 0 \end{pmatrix}$, B = $\begin{pmatrix} 2 & 1 & 2 \\ 1 & 2 & 4 \end{pmatrix}$ find (AB)'. Hence verify (AB)'= B'A'.

3. Prove that $\begin{vmatrix} 0 & c & b \\ -c & 0 & a \\ -b & -a & 0 \end{vmatrix} = 0.$

4. Verify whether A = $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 2 & 1 & 2 \end{pmatrix}$ is singular

5. Investigate for the consistency of the following equations using elementary transformations.
   $4x$ - $2y + 6z = 8$
   $x + y$ - $3z$ = -1
   $15x$ - $3y + 9z = 21$

6. Write the properties of Eigen roots.

7. Write down the quadratic form corresponding to the matrix A = $\begin{pmatrix} 1 & 2 & 5 \\ 2 & 0 & 3 \\ 5 & 3 & 4 \end{pmatrix}$

8. Define the following:
   (i) Trace of the matrix
   (ii) Symmetric matrix
   (iii) Hermitian matrix.

Contd...

Section C

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

9. If A $= \begin{pmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{pmatrix}$ and B $= \begin{pmatrix} -3 & -2 \\ 1 & -5 \\ 4 & 3 \end{pmatrix}$ then find D$= \begin{pmatrix} p & q \\ r & s \\ t & u \end{pmatrix}$ so that A + B -D = 0

10. Show that $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix} = 0$

11. Find the inverse of A $= \begin{pmatrix} 1 & 2 & -2 \\ -1 & 3 & 0 \\ 0 & -2 & 1 \end{pmatrix}$ using elementary transformations.

12. Find the Eigen values and Eigen vectors of the matrix A$= \begin{bmatrix} 1 & -2 \\ -5 & 4 \end{bmatrix}$

13. Reduce $3x^2 + 3z^2 + 4xy + 8xz + 8yz$ into canonical form.

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