B.Sc. DEGREE EXAMINATION,APRIL 2019
Semester –II
Matrix Algebra

Time : 3 Hours **Max.marks :60**

Section A $(10 \times 1 = 10)$ Marks

Answer any **TEN** questions

1. If A $=\begin{bmatrix} 1 & 2 \\ -1 & 0 \end{bmatrix}$ and B $=\begin{bmatrix} 2 & -1 \\ 4 & 3 \end{bmatrix}$ compute 2A-3B
2. Define Idempotent matrix.
3. When do we say a matrix is invertible?
4. Define rank of a matrix.
5. What do you understand by non-trival solution in linear homogeneous equations?
6. Define non-linear homogeneous equations.
7. Define Eigen vector.
8. Show that zero is the characteristic root of a square matrix A, then A is singular.
9. Define quadratic form.
10. What is signature of quadratic form?
11. State the associative law of matrix multiplication.
12. When do we say a matrix is involutory?

Section B $(5 \times 4 = 20)$ Marks

Answer any **FIVE** questions

13. Show that if A is an orthogonal matrix then A^T and A^{-1} are also orthogonal matrices.
14. If A and B are Hermitian matrices then show that AB-BA is skew Hermitian matrix.
15. Show that the inverse of the product of two non-singular matrices A and B is equal to the product of the inverses A^{-1} and B^{-1} in the reverse order.
16. Obtain the rank of the following matrix

A$=\begin{pmatrix} 3 & -1 & 2 \\ -6 & 2 & -4 \\ -3 & 1 & -2 \end{pmatrix}$.

17. Solve the following equations by the means of matrices

    x+ y+ z =7

    x+2y+3z=16

    x+3y+4z=22

18. If λ is a characteristic root of a non-singular matrix A, then show that λ^{-1} is a characteristic root of A^{-1}

19. Reduce the following symmetric matrices to diagonal form and interpret the result in terms of quadratic form

$$\begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & -3 \end{pmatrix}$$

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. Explain the three laws of matrix addition.

21. a) Show that inverse of matrix if exists is unique
    b) If A is a symmetric matrix then prove that adjA is also a symmetric matrix.

22. State and prove the necessary and sufficient conditions for the system of non-homogeneous equations to be consistent.

23. State and prove Cayley Hermilton theorem.

24. If A is a real symmetric 'n' rowed matrix of rank 'r' show that the semi-definite quadratic form $X'AX$ is expressed as a quadratic form in 'r' variables.

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