B.Sc. DEGREE EXAMINATION,APRIL 2020
I Year II Semester
Matrix Algebra

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

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

Answer any **TEN** questions

1. Define a diagonal matrix.
2. Give an example of symmetric matrix.
3. Explain inverse of a matrix.
4. Define rank of a matrix.
5. Explain the term consistency in linear equations.
6. State the conditions under which the a system of m non homogeneous linear equations in n unknowns will have infinite number of solutions.
7. Write down the characteristic root of a square matrix which is singular.
8. What are Eigen vectors?
9. Give an example of quadratic form.
10. Write a note on index and signature of real quadratic form.
11. Give an example of trace of a matrix.
12. Find the characteristic root of $\begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$

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

Answer any **FIVE** questions

13. Show that every square matrix is uniquely expressed as sum of Hermitian and skew-Hermitian matrices.
14. Show that inverse of a symmetric matrix is symmetric.
15. Solve the following equations by means of matrices $x + y + z = 7;\ x + 2y + 3z = 16;$ x+3y+4z=22.
16. Prove that $AX = \lambda X$has non trivial solution X if and only if λ is a characteristic root of A.
17. Prove that the quadratic form $x_1^2 + 2x_2^2 + 2x_3^2 - 2x_1x_2 - 2x_2x_3 + x_2x_1$is a positive definite.

18. Find the rank of a matrix $\begin{pmatrix} 1 & 5 & 4 \\ 4 & 8 & 12 \\ 7 & 11 & 15 \end{pmatrix}$ using normal form.
19. State and prove any two properties of matrix addition.

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

Answer any **THREE** questions

20. Show that A^2 is symmetric if either A is symmetric or A is skew-symmetric.
21. If A is non singular then (i) $\left(A^{-1}\right)^{-1} = A$ (ii)$\left(A^{'}\right)^{-1} = \left(A^{-1}\right)^{1}$.
22. Explain elementary transformation in detail.
23. State and establish Cayley-Hamilton Theorem.
24. If a linear transformation $X = BY$is applied to the quadratic form $A\,(x,\, x)$the resultant is again a quadratic form $C\,(y,\, y)$ where the matrix C is given by $C = B^{'}AB$.

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