

B.Sc (H) Physics - V Sem
Advanced Mathematical Physics
(32227502)
(Assignment 2023-24)

QUIZZZ

NAME :

CLASS :

DATE :

MATRIX CHALLENGE

30 Questions

MM: 78

1. Which one is the characteristic equation ?

A $[A - mI] = 0$

B $|A|X = mX$

C $AX = mX$

D $|A - mI| = 0$

2. Choose the Correct Options

A Sum of the Diagonal Elements of A = Trace of the Eigen value Diagonal matrix D

B Sum of the Eigen Values of A = Determinant of A

C Sum of the Diagonal Elements of A = Trace of transpose of A

D Sum of the Eigen Values of A = Trace of A

3. What is true about singular matrix A?

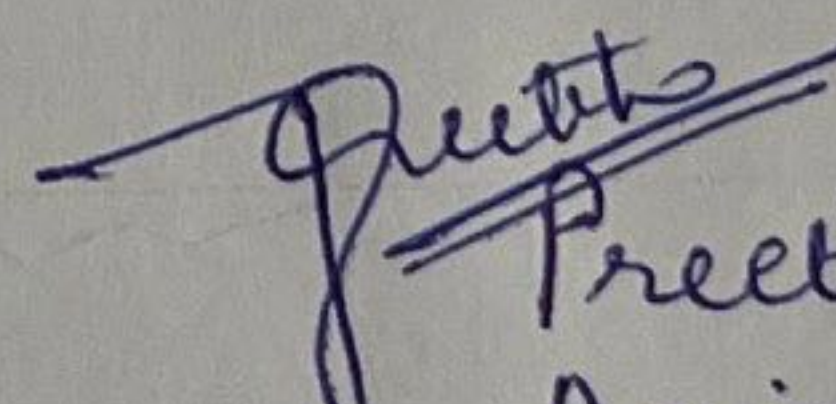
A $|A|$ is 0

B Its inverse do not exist

C $|A|$ is not 0

D Atleast one of the Eigen Value if 0 implies its singularity

4. Norm of the Row matrix $A = [1 \ 2 \ -2i]$ is


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5. Eigen Vectors corresponding to distinct Eigen values are
- ☐ A None of the above ☐ B normalized
- ☐ C Linearly Independent ☐ D Linearly Dependent
6. What is true about Hermitian matrix?
- ☐ A Eigen Values are real but the Eigen vectors are not mutually orthogonal ☐ B Transpose Conjugate of $A = A$
- ☐ C Transpose Conjugate of $A = -A$ ☐ D Eigen Values are real and the Eigen vectors (for distinct Eigen values) are mutually orthogonal
7. What is true about Unitary Matrix?
- ☐ A Modulus of each Eigen value is unity ☐ B Eigen value is +1 or -1
- ☐ C Transpose conjugate of $A = \text{inverse of } A$ ☐ D Transpose conjugate of $A = A$
8. Find the Eigen Values of (in increasing order)
 $\begin{bmatrix} -1 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & -9 \end{bmatrix}$

9. Choose the correct options if $AB=BA$

- ☐ A If A is diagonal, then B is also diagonal ☐ B All of the above
- ☐ C $B=A^{-1}$ ☐ D A and B commutes wrt multiplication

10. Choose the correct options for matrix A of order 2×3

- A Cayley Hamilton Theorem states that A satisfies its own characteristic equation
- B None of the above
- C inverse of $A = \text{adjoint } A / |A|$
- D Both of the above

11. Choose the Correct Option

- A Determinant of Hermitian Matrix is Real
- B Diagonal Elements of Skew Hermitian Matrix is 0 or purely imaginary
- C Every matrix commutes with its inverse
- D All of the above

12. If X is the column vector of order n and A is a square matrix of order n, then what is the order of $X'AX$?

- A $n \times n$
- B $1 \times n$
- C 1×1
- D $n \times 1$

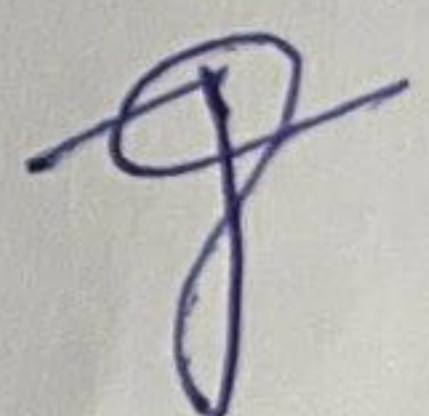
13. A real symmetric matrix of order 3 will have ____ no. of independent components

- A 4
- B 6
- C 8
- D 12

14. Tell the nature of this matrix $\begin{bmatrix} i & i & i \\ i & i & i \\ i & i & i \end{bmatrix}$

- A Skew Hermitian
- B Orthogonal
- C Hermitian
- D Unitary

15. Which one is orthogonal matrix?

- A $\begin{bmatrix} \cos x & -\sin x \\ -\sin x & \cos x \end{bmatrix}$
- B $\begin{bmatrix} -\cos x & \sin x \\ \sin x & -\cos x \end{bmatrix}$
- C $\begin{bmatrix} \cos x & \sin x \\ \sin x & \cos x \end{bmatrix}$
- D $\begin{bmatrix} \cos x & \sin x \\ -\sin x & \cos x \end{bmatrix}$
- 

16. If A and B are the two Eigen vectors, then the condition for their orthogonality is

☐ A $\bar{A}' B = 0$

☐ B $B \bar{A}' = 1$

☐ C $\bar{A}' B = 1$

☐ D $B \bar{A}' = 0$

17. How will you define unitary matrix A?

☐ A $A \bar{A}' = I$

☐ B $\bar{A}' A = I$

☐ C $A' A = I$

☐ D $\bar{A}' = A^{-1}$

18. What is the trace of $A = \begin{bmatrix} 2 & 3 & 6 \\ -9 & 0 & 8 \\ 6 & 2 & 3 \end{bmatrix}$

☐ A 4

☐ B 5

☐ C -4

☐ D -5

19. Classify the matrix

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 5 \end{pmatrix}$$

☐ A Square matrix, Identity matrix

☐ B Idempotent matrix, Diagonal matrix

☐ C Square matrix, triangular matrix

☐ D Square matrix, Diagonal matrix

20. You can post multiply a 2×3 matrix by which matrix?

☐ A 2×2

☐ B 2×12

☐ C 3×12

☐ D 2×3

21. There are _____ number of elements in 3×6 matrix

22. Which of the following can have imaginary determinant?

A Skew Hermitian

B None

C Hermitian

D Both

23. Choose the correct option(s)

A Similar matrices have same Eigen values

B Diagonalizing matrix of a diagonal matrix is identity matrix

C Similar matrices have same eigen vectors

D Diagonalizing matrix of a diagonal matrix is a null matrix

24. A system of equations will have many solutions if

A No of independent constraints is 0

B no. of independent constraints is equal to unknowns

C no. of independent constraints is less than unknowns

D no. of independent constraints is greater than unknowns

25. Inner Product is

A a scalar quantity

B a vector quantity

C always same as a dot product

D sometimes scalar sometimes vector

26. $B = 7x_1y_1 - 3x_2y_1 + 8x_1y_2 + 10y_2x_2$. The matrix representation of this bilinear form is

A $[10 \ -3; -8 \ 7]$

B $[10 \ 8; -3, \ 7]$

C $[7 \ 8; -3 \ 10]$

D $[7 \ -3; 8 \ 10]$

27. Which of them are Normal Matrix?

A Hermitian

B Unitary

C Skew Hermitian

D Real Orthogonal

28. Zeroth power of any matrix is

☐ A Identity matrix

☐ B matrix itself

☐ C Ones Matrix

☐ D Null matrix

29. Choose the correct option

☐ A $\exp(A) = P \cdot \exp(D) \cdot P^{-1}$

☐ B $P^{-1} D = \exp(A) P$

☐ C $\exp(A) = P^{-1} \cdot \exp(D) \cdot P$

☐ D $\exp(A) = P^{-1} \cdot P \cdot \exp(D)$

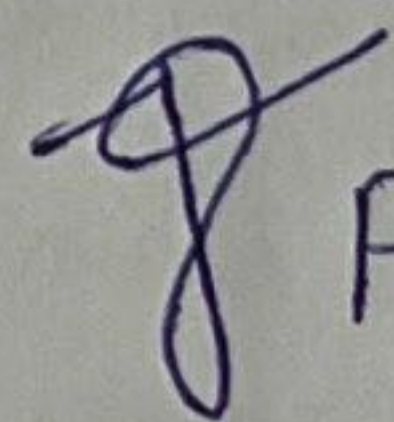
30. Choose the correct option (s)

☐ A Matrix and its inverse have same eigen vectors

☐ B Matrix and its inverse product is identity matrix provided matrix is singular

☐ C Matrix and its inverse is commutative wrt multiplication

☐ D Matrix and its inverse have same eigen values

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