

SRM INSTITUTE OF SCIENCE AND TECHNOLOGY RAMAPURAM CAMPUS DEPARTMENT OF MATHEMATICS CONTINUOUS ASSESSMENT TEST – 1

* Required

Answer ALL Questions

Each question carries ONE mark.

1. *

The sum of the eigen values of $A = \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$ is

(A) 2 (B) 4 (C) -3 (D) 0

☒ A

☐ B

☐ C

☐ D



2. *

If $A = \begin{pmatrix} 1 & 5 & -1 \\ 0 & 3 & 2 \\ 0 & 0 & 4 \end{pmatrix}$, then the eigen values of A^{-1} are

(A) 2, 3, 4 (B) 2, 5, -1 (C) 0, 0, 0 (D) $1, \frac{1}{3}, \frac{1}{4}$

☐ A☐ B☐ C☒ D

3. *

If two eigen values of $A = \begin{pmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{pmatrix}$ are 3 and 15, then the third eigen value is _____.

(A) 1 (B) 0 (C) 2 (D) 3

☐ A☒ B☐ C☐ D

4. *

If $-1, -1, 2$ are the eigen values of the matrix $A = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$, then the eigen values of A^T are

(A) 1,1,2 (B) 1, 1, 1/2 (C) 1,1,4 (D) $-1, -1, 2$

- ☐ A
- ☐ B
- ☐ C
- ☒ D

5. *

The sum of eigen values of the identity matrix of order 3 is

(A) 0 (B) 1 (C) 2 (D) 3

- ☐ A
- ☐ B
- ☐ C
- ☒ D



6. *

The index of the canonical form $Q = -y_1^2 + y_2^2 + 4y_3^2$ is

(A) 3

(B) 2

(C) 1

(D) 0

☐ A☒ B☐ C☐ D

7. *

If the eigen values of the matrix of the quadratic form $2x_1^2 + 6x_2^2 + 2x_3^2 + 8x_1x_3$ are $-2, 6, 6$, then the nature of the quadratic form is _____.

(A) positive semi-definite

(B) indefinite

(C) negative definite

(D) positive definite

☐ A☒ B☐ C☐ D

8. *

The matrix corresponding to the quadratic form $x_1^2 + 5x_2^2 + x_3^2 + 2x_2x_3 + 6x_3x_1 + 2x_1x_2$ is

(A) $\begin{pmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{pmatrix}$

(B) $\begin{pmatrix} 1 & 2 & 3 \\ 1 & 5 & 2 \\ 3 & 2 & 1 \end{pmatrix}$

(C) $\begin{pmatrix} 1 & 4 & 4 \\ 4 & 5 & 3 \\ 4 & 3 & 1 \end{pmatrix}$

(D) $\begin{pmatrix} 1 & 4 & 3 \\ 4 & 5 & 4 \\ 3 & 4 & 1 \end{pmatrix}$

☒ A☐ B☐ C☐ D

9. *

A homogeneous polynomial of _____ degree in any number of variables is called a quadratic form.

(A) first (B) second (C) third (D) fourth

☐ A☒ B☐ C☐ D

10. *

A square matrix A is called orthogonal, if

(A) $A = A^2$ (B) $A = A^{-1}$ (C) $A^T = A^{-1}$ (D) $AA^{-1} = I$

☐ A

☐ B

☒ C

☐ D

11. *

The sum of the squares of the eigen values of $A = \begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$ is

(A) 10 (B) 38 (C) 45 (D) 20

☐ A

☒ B

☐ C

☐ D



12. *

If the sum of two eigen values and trace of a 3×3 matrix A are equal, then the value of determinant (A) is

(A) 0 (B) 1 (C) -1 (D) 2

- ☒ A
☐ B
☐ C
☐ D

13. *

The sum and product of the eigen values of $A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix}$ are

(A) 5, 3 (B) 3, 5 (C) 2, 1 (D) 0, 1

- ☒ A
☐ B
☐ C
☐ D



14. *

The eigen vectors corresponding to the distinct eigen values of a real symmetric matrix are

(A) imaginary (B) non-orthogonal (C) real (D) orthogonal

- ☐ A
- ☐ B
- ☐ C
- ☒ D

15. *

The characteristic equation of the matrix $A = \begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$ is

(A) $\lambda^2 - 7\lambda + 6 = 0$ (B) $\lambda^2 + 7\lambda + 6 = 0$
(C) $\lambda^2 - 7\lambda - 6 = 0$ (D) $\lambda^2 - 7\lambda + 5 = 0$

- ☒ A
- ☐ B
- ☐ C
- ☐ D



16. *

The eigen values of an orthogonal matrix have the absolute value

(A) 0 (B) 1 (C) 2 (D) 3

- ☐ A
- ☒ B
- ☐ C
- ☐ D

17. *

The number of positive terms in the canonical form is called

(A) signature (B) index (C) quadratic form (D) positive definite

- ☐ A
- ☒ B
- ☐ C
- ☐ D



18. *

If $A = \begin{pmatrix} 3 & 2 & 4 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{pmatrix}$, then the eigen values of A^2 are

(A) 6, 4, 10 (B) 9, 4, 25 (C) 9, 2, 5 (D) 3, 2, 5

☐ A

☒ B

☐ C

☐ D

19. *

If $A = \begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$, then the eigen values of A^{10} are

(A) $1, 3^{10}$ (B) 1, 3 (C) $3^2, 1^{10}$ (D) 1, 10

☒ A

☐ B

☐ C

☐ D



20. *

The eigen values of the matrix $A = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$ are

(A) 1, -3 (B) 3, 1 (C) 2, 1 (D) 1, 2

☐ A

☒ B

☐ C

☐ D

21. *

The difference between the number of positive terms and negative terms in the canonical form is called

(A) signature (B) index (C) quadratic (D) positive definite

☒ A

☐ B

☐ C

☐ D



22. *

According to Cayley-Hamilton theorem "Every _____ matrix satisfies its own characteristic equation".

(A) square (B) row (C) rectangle (D) column

☒ A

☐ B

☐ C

☐ D

23. *

The product of the eigen values of matrix A is equal to its

(A) determinant (B) trace (C) 0 (D) unity

☒ A

☐ B

☐ C

☐ D



24. *

The nature of the quadratic form $2x^2 + 3y^2 + 2z^2 + 2xy$ is

- (A) positive definite (B) negative definite
(C) positive semi-definite (D) indefinite

- ☒ A
☐ B
☐ C
☐ D

25. *

All the eigen values of a symmetric matrix with real elements are

- (A) distinct (B) real
(C) equal (D) conjugate complex numbers

- ☐ A
☒ B
☐ C
☐ D

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