

1. The eigen values of A^T are

- A) Same as those of A B) Different from those of A
- C) Negative of eigen values of A D) Inverse of eigen values of A

Ans: A) Same as those of A

2. The trace of the matrix $\begin{bmatrix} 1 & 3 & 5 \\ 2 & 6 & 7 \\ 8 & 9 & 4 \end{bmatrix}$ is

- A) 9 B) 11 C) 10 D) -8

Ans: B) 11

3. If the eigen values of A are 6, 7, 8 then the eigen values of $3A$ are

- A) 8,7,6 B) $1/6, 1/7, 1/8$ C) 6, 7, 8 D) 18, 21, 24

Ans: D) 18, 21, 24

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

- A) 2, 50 B) 16, 8 C) 32, 8 D) 42, 18

Ans: C) 32,8

5. If two eigen values of a 3×3 matrix whose determinant is 4 are -1, 2, then the 3rd eigen value is

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

Ans: A) -2

6. Sum of the eigen values of the matrix $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 2 & 2 \\ 1 & 2 & 3 \end{pmatrix}$ is

- A) 1 B) 2 C) 3 D) 6

Ans: D) 6

7. If k_1, k_2 are the eigen values of the matrix A, then the eigen values of A^{-1} (if it exists) are

- A) k_1, k_2 B) k_1^2, k_2^2 C) $\frac{1}{k_1}, \frac{1}{k_2}$ D) $\frac{1}{k_1^2}, \frac{1}{k_2^2}$

Ans: C) $\frac{1}{k_1}, \frac{1}{k_2}$

8. For a singular matrix of order 3, if two of the eigen values are 11 and 25 then the third eigen value is

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

Ans: B) 0

9. Eigen values of the matrix $A = \begin{pmatrix} 4 & 1 \\ 3 & 2 \end{pmatrix}$ are

- A) 5,1 B) 5,0 C) 5,5 D) 1,1

Ans: A) 5,1

10. Diagonalisation by orthogonal transformation is possible only for

- A) a real symmetric matrix B) a real skew symmetric matrix
C) a complex symmetric matrix D) a complex non symmetric matrix

Ans: A) a real symmetric matrix

11. If the characteristic equation of $\begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$ is $\lambda^3 + a\lambda^2 + b\lambda - 12 = 0$, then the

values of 'a' and 'b' are

- A) 0, 13 B) 6, 13 C) 6, -13 D) 0, -13

Ans: D) 0, -13

12. The eigen values of a triangular matrix are

- A) elements of first column B) diagonal elements
C) elements of last row D) elements of first row

Ans: B) diagonal elements

13. Two vectors $\begin{pmatrix} a \\ b \\ c \end{pmatrix}, \begin{pmatrix} x \\ y \\ z \end{pmatrix}$ are orthogonal if

- A) $a+b+c=x+y+z$ B) $ax+by+cz=0$
C) $ax+by+cz=1$ D) $ax+by+cz=a^2+b^2+c^2+x^2+y^2+z^2$

Ans: B) $ax+by+cz=0$

14. The eigen values of $\lambda^3 - 18\lambda^2 + 99\lambda - 162 = 0$ are

- A) 9, 18, 1 B) 4, 3, 2 C) 1, 2, 3 D) 3, 6, 9

Ans: D) 3,6,9

15. Cayley – Hamilton theorem is used

- A) to find eigen values B) to find eigen vectors
C) to find the inverse of a matrix D) to diagonalise the given matrix

Ans: C) to find the inverse of a matrix

16. By Cayley-Hamilton theorem the square matrix $A = \begin{pmatrix} 1 & 4 \\ 2 & 3 \end{pmatrix}$ satisfies the equation

$\lambda^2 - 4\lambda - 5 = 0$. Then the inverse of A is

- A) $\begin{bmatrix} -\frac{3}{5} & \frac{4}{5} \\ \frac{2}{5} & -\frac{1}{5} \end{bmatrix}$ B) $\begin{bmatrix} -3 & 4 \\ 2 & -1 \end{bmatrix}$ C) $\begin{bmatrix} -15 & 20 \\ 10 & -5 \end{bmatrix}$ D) $\begin{bmatrix} \frac{3}{5} & -\frac{4}{5} \\ -\frac{2}{5} & \frac{1}{5} \end{bmatrix}$

Ans: A) $\begin{bmatrix} -\frac{3}{5} & \frac{4}{5} \\ \frac{2}{5} & -\frac{1}{5} \end{bmatrix}$

17. The index and signature of the quadratic form $x_1^2 + 2x_2^2 - 3x_3^2$ are

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

Ans: A) 2, 1

18. The matrix of the quadratic form $12x_1^2 + 12x_2^2 + 15x_3^2 + 16x_2x_3 - 10x_3x_1 - 14x_1x_2$ is

- A) $\begin{pmatrix} 12 & -14 & -10 \\ -7 & 12 & 8 \\ -5 & 8 & 15 \end{pmatrix}$ B) $\begin{pmatrix} 6 & -7 & -5 \\ -7 & 6 & 8 \\ -5 & 8 & 7.5 \end{pmatrix}$

$$C) \begin{pmatrix} 12 & -7 & -5 \\ -7 & 12 & 8 \\ -5 & 8 & 15 \end{pmatrix}$$

$$D) \begin{pmatrix} 12 & -7 & -5 \\ -14 & 12 & 16 \\ -10 & 8 & 15 \end{pmatrix}$$

Ans: C) $\begin{pmatrix} 12 & -7 & -5 \\ -7 & 12 & 8 \\ -5 & 8 & 15 \end{pmatrix}$

19. Quadratic form of whose matrix $\begin{pmatrix} 0 & 1 & 3 \\ 1 & 6 & 5 \\ 3 & 5 & 1 \end{pmatrix}$ is

A) $0x_1^2 + 6x_2^2 + 2x_1x_2 + 6x_1x_3 + 10x_3x_2$

B) $6x_2^2 + x_3^2 + 2x_1x_2 + 6x_1x_3 + 10x_3x_2$

C) $6x_2^2 + x_3^2 + x_1x_2 + 3x_1x_3 + 5x_3x_2$

D) $0x_1^2 + 6x_2^2 + x_3^2 + x_1x_2 + 3x_1x_3 + 5x_3x_2$

Ans: B) $6x_2^2 + x_3^2 + 2x_1x_2 + 6x_1x_3 + 10x_3x_2$

20. Nature of the quadratic form $x_1^2 - x_2^2 + 4x_3^2$ is

A) Indefinite

B) positive definite

C) negative definite

D) definite

Ans: A) Indefinite

21. If the quadratic form $2x_1^2 + x_2^2 + x_3^2 + 2x_1x_2 - 2x_1x_3 - 4x_2x_3$ is reduced to the canonical

form $-y_1^2 + y_2^2 + 4y_3^2$, then the rank and index of the quadratic form are

A) 2, 2

B) 3, 2

C) 3, 1

D) 2, 1

Ans: B) 3, 2

22. The product of two eigen values of the matrix $A = \begin{pmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{pmatrix}$ is 9.

Then the other eigen value is.

A) -5

B) 5

C) 15

D) 10

Ans: B) 5

23. Find rank of the Quadratic Form whose Canonical form is $5y_2^2 + 12y_3^2$

(A) 3

(B) 2

(C) 1

(D) 0

Ans: (B) 2

24. Write the Q.F. defined by the matrix $A = \begin{pmatrix} 2 & 6 \\ 6 & 3 \end{pmatrix}$

(A) $2x^2 + 3y^2 + 6xy$

(B) $2x^2 + 3y^2 - 6xy$

(C) $2x^2 + 3y^2 + 12xy$

(D) $2x^2 + 3y^2 + 3xy$

Ans: (C) $2x^2 + 3y^2 + 12xy$

25. The sum and the product of the Eigen values of a 3x3 matrix are 4 and -6 respectively.

If one of the Eigen value is -1 then, find the other two Eigen values.

(A) 1,1

(B) 1,2

(C) 2,3

(D) 4,3

Ans: (C) 2,3