



SRM Institute of Science and Technology
Ramapuram Campus
Department of Mathematics
18MAB101T – Calculus And Linear Algebra

Year/Sem: I/I

Branch: Common to ALL B.Tech. except B.Tech. (Business Systems)

Unit – I

MATRICES

Part – A

1.	The sum of the eigen values of $A = \begin{pmatrix} 1 & 2 \\ 2 & 1 \end{pmatrix}$ is	1 Mark	
	(a) 2 (b) 4 (c) -3 (d) 0	Ans (a)	(CLO – 1 Apply)
2.	The eigen values of A^{-1} , if $A = \begin{pmatrix} 1 & 5 & -1 \\ 0 & 3 & 2 \\ 0 & 0 & 4 \end{pmatrix}$ are	1 Mark	
	(a) 2, 3, 4 (b) 2, 5, -1 (c) 0, 0, 0 (d) $1, \frac{1}{3}, \frac{1}{4}$	Ans (d)	(CLO -1 Apply)
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 _____.	1 Mark	
	(a) 1 (b) 0 (c) 2 (d) 3	Ans (b)	(CLO -1 Apply)
4.	If -1, -1, 2 are the eigen values of a matrix $A = \begin{pmatrix} 0 & 1 & 1 \\ 1 & 0 & 1 \\ 1 & 1 & 0 \end{pmatrix}$, then the eigen values of A^T are	1 Mark	
	(a) -1, -1, 2 (b) 1, 1, 1/2 (c) 1,1,4 (d) -1,-1,-2	Ans (a)	(CLO - 1 Apply)

5.	The sum of eigen values of the identity matrix of order 3 is	1 Mark	
	(a) 0 (b) 1 (c) 2 (d) 3	Ans (d)	(CLO - 1 Remember)
6.	The product of the two eigen values of the matrix $A = \begin{pmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{pmatrix}$ is 4. Then the third eigen value is	1 Mark	
	(a) 2 (b) 1 (c) 3 (d) 8	Ans (d)	(CLO - 1 Apply)
7.	The index of the canonical form $Q = -y_1^2 + y_2^2 + 4y_3^2$ is	1 Mark	
	a) 3 (b) 2 (c) 1 (d) 0	Ans (b)	(CLO -1 Apply)
8.	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 _____.	1 Mark	
	(a) positive semi-definite (b) indefinite (c) negative definite (d) positive definite	Ans (b)	(CLO - 1 Apply)
9.	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	1 Mark	
	(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) $\begin{pmatrix} 1 & 4 & 3 \\ 4 & 5 & 4 \\ 3 & 4 & 1 \end{pmatrix}$	Ans (a)	(CLO - 1 Apply)
10.	A homogeneous polynomial of the _____ degree in any number of variables is called a quadratic form.	1 Mark	

	(a) first (b) second (c) third (d) fourth	Ans (b)	(CLO - 1 Remember)
11.	A square matrix A is called orthogonal if	1 Mark	
	(a) $A = A^2$ (b) $A = A^{-1}$ (c) $A^T = A^{-1}$ (d) $AA^{-1} = I$	Ans (c)	(CLO - 1 Remember)
12.	The sum of the squares of the eigen values $\begin{pmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{pmatrix}$ is	1 Mark	
	(a) 10 (b) 38 (c) 45 (d) 20	Ans (b)	(CLO - 1 Apply)
13.	All the eigen values of a symmetric matrix with real elements are	1 Mark	
	(a) distinct (b) real (c) equal (d) conjugate complex numbers	Ans (b)	(CLO - 1 Remember)
14.	If the sum of two eigen values and trace of a 3 x 3 matrix A are equal, then the value of det (A) is	1 Mark	
	(a) 0 (b) 1 (c) -1 (d) 2	Ans (a)	(CLO - 1 Apply)
15.	If the canonical form of a quadratic form is $-y_1^2 + y_2^2 + 2y_3^2$, then the signature of the quadratic form is	1 Mark	
	(a) 2 (b) 1 (c) 0 (d) 3	Ans (b)	(CLO - 1Apply)
16.	Find the sum and product of the eigen values of $A = \begin{pmatrix} 2 & 1 & 1 \\ 1 & 2 & 1 \\ 0 & 0 & 1 \end{pmatrix}$	1 Mark	

	(a) 5, 3 (b) 3, 5 (c) 2, 1 (d) 0, 1	Ans (a)	(CLO - 1 Apply)
17.	The eigen vectors corresponding to the distinct eigen values of a real symmetric matrix are	1 Mark	
	(a) imaginary (b) non-orthogonal (c) real (d) orthogonal	Ans (d)	(CLO - 1 Remember)
18.	The eigen values of a skew symmetric matrix are	1 Mark	
	(a) real (b) purely imaginary or zero (c) unitary (d) orthogonal	Ans (b)	(CLO - 1 Remember)
19.	Find the characteristic equation of the matrix $A = \begin{pmatrix} 5 & 4 \\ 1 & 2 \end{pmatrix}$	1 Mark	
	(a) $\lambda^2 - 7\lambda + 6 = 0$ (b) $\lambda^2 + 7\lambda + 6 = 0$ (c) $\lambda^2 - 7\lambda - 6 = 0$ (d) $\lambda^2 - 7\lambda + 5 = 0$	Ans (a)	(CLO - 1 Apply)
20.	The eigen values of an orthogonal matrix have the absolute value	1 Mark	
	(a) 0 (b) 1 (c) 2 (d) 3	Ans (b)	(CLO -1 Remember)
21.	The number of positive terms in the canonical form is called	1 Mark	
	(a) Signature (b) Index (c)quadratic (d)positive definite	Ans (b)	(CLO - 1Remember)
22.	The difference between the positive terms and negative terms in the canonical form is called	1 Mark	
	(a) Signature (b) Index (c)quadratic (d)positive definite	Ans (a)	(CLO - 1 Remember)

23.	Find the eigen values of A^2 if $A = \begin{pmatrix} 3 & 2 & 4 \\ 0 & 2 & 0 \\ 0 & 0 & 5 \end{pmatrix}$.	1 Mark	
	(a) 6, 4, 10 (b) 9, 4, 25 (c) 9, 2, 5 (d) 3, 2, 5	Ans (b)	(CLO - 1 Apply)
24.	Find the nature of the quadratic form $2x^2 + 3y^2 + 2z^2 + 2xy$	1 Mark	
	(a) Positive definite (b) Negative definite (c) Positive semi-definite (d) Indefinite	Ans (a)	(CLO – 1 Apply)
25.	Find the eigen values of A^{10} if $A = \begin{pmatrix} 1 & 2 \\ 0 & 3 \end{pmatrix}$	1 Mark	
	(a) $1, 3^{10}$ (b) 1, 3 (c) $3^2, 1^{10}$ (d) 1, 10	Ans (a)	(CLO - 1 Apply)
26.	Find the eigen values of the matrix $A = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$.	1 Mark	
	(a) 1, -3 (b) 3, 1 (c) 2, 1 (d) 1, 2	Ans (b)	(CLO - 1 Apply)
27.	If the sum of two eigen values and trace of a 3 x 3 matrix A are equal, then the value of determinant of A is	1 Mark	
	(a) 0 (b) 1 (c) -1 (d) 2	Ans (a)	(CLO - 1 Apply)
28.	Find the eigen values of the matrix $A^3 = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$.	1 Mark	

	(a) 1, -3 (b) 3, 1 (c) 1, 27 (d) 1, -9	Ans (c)	(CLO - 1Apply)
29.	The eigen values of the matrix $A^{-1} = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$	1 Mark	
	(a) 1, 1/3 (b) 3, 1 (c) -2, 1 (d) 1, 2	Ans (a)	(CLO - 1 Apply)
30.	Find the sum and product of the eigen values of the matrix $A = \begin{pmatrix} 2 & 1 \\ 1 & 2 \end{pmatrix}$.	1 Mark	
	(a) 4, 3 (b) 3, 1 (c) -2, 1 (d) 1, 2	Ans (a)	(CLO - 1 Apply)
31.	Find the eigen values of $A = \begin{pmatrix} 2 & 2 & 0 \\ 2 & 1 & 1 \\ -7 & 2 & -3 \end{pmatrix}$.	1 Mark	
	(a) 1,3,-4 (b) 1,-3,-4 (c) 1,-3,4 (d) -1,3,-4	Ans (a)	(CLO - 1 Apply)
32.	Two eigen values of $A = \begin{pmatrix} 4 & 6 & 6 \\ 1 & 3 & 2 \\ -1 & -5 & -2 \end{pmatrix}$ are equal and they are double the third. Find them.	1 Mark	
	(a) 1, 2, 2 (b) 2, 1, 1 (c) 2, 0, 1 (d) 1, 2, 3	Ans (a)	(CLO - 1Apply)
33.	The eigen values of a diagonal matrix are the _____ elements of the matrix.	1 Mark	

	(a) diagonal (b) upper triangular (c) zero (d) unity	Ans (a)	(CLO - 1 Remember)
34.	Cayley-Hamilton theorem states that “Every _____ matrix satisfies its own characteristic equation”.	1 Mark	
	(a) square (b) column (c) row (d) zero	Ans (a)	(CLO - 1Remember)
35.	Find rank and index of the QF whose canonical form is $3x^2 - 3y^2$.	1 Mark	
	(a) 2, 1 (b) 1, 2 (c) 0, 1 (d) 0, 2	Ans (a)	(CLO – 1 Apply)
36.	Write the Q.F. defined by the matrix $A = \begin{pmatrix} 6 & 1 & -7 \\ 1 & 2 & 0 \\ -7 & 0 & 1 \end{pmatrix}$	1 Mark	
	(a) $6x^2 + 2y^2 + z^2 + 2xy - 14xz$ (b) $6x + y^2 + 6z^2 + x y - 7xz$ (c) $6x^2 + 2y^2 + z^2 + 2xy + 14xz$ (b) $6x + y^2 + 6z^2 + x y - 14xz$	Ans (a)	(CLO -1Apply)