MATRICES and DETERMINANTS :

1.	If A = $\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$, B = $\begin{bmatrix} 2 & 6 \\ 4 & 3 \end{bmatrix}$, find the matrix X such that A – 2B + X is a unit matrix.
2.	If A = $\begin{bmatrix} 1 & 2 & 2 \\ -3 & -1 & 0 \end{bmatrix}$, B = $\begin{bmatrix} 2 & -3 & 4 \\ 5 & -6 & 0 \end{bmatrix}$, find matrix C such that 2A – 3B + C is a zero matrix.
3.	A. Verify that $(A + B)^T = A^T + B^T$ for : i. A = $\begin{bmatrix} 2 & -1 & 2 \\ 4 & 3 & -5 \end{bmatrix}$, B = $\begin{bmatrix} -1 & 2 & 4 \\ 8 & -1 & 3 \end{bmatrix}$ ii. A = $\begin{bmatrix} 4 & 1 & 2 \\ 1 & 3 & 1 \end{bmatrix}$, B = $\begin{bmatrix} 2 & 1 & 8 \\ -2 & 1 & -6 \end{bmatrix}$ iii. A = $\begin{bmatrix} 1 & -1 \\ 2 & 3 \\ -4 & 1 \end{bmatrix}$, B = $\begin{bmatrix} 4 & -2 \\ -3 & 1 \\ 2 & 3 \end{bmatrix}$ B. If A = $\begin{bmatrix} 3 & -4 \\ 1 & 1 \\ 2 & 0 \end{bmatrix}$, B = $\begin{bmatrix} 2 & 1 & 2 \\ 1 & 3 & 4 \end{bmatrix}$ then show that $(AB)^T = B^TA^T$
4.	Find matrix X if Y = $\begin{bmatrix} 3 & 2 \\ 0 & 4 \end{bmatrix}$ and 2X + Y = $\begin{bmatrix} 1 & 0 \\ -3 & 2 \end{bmatrix}$
5.	Find matrix X and Y if X + Y = $\begin{bmatrix} 7 & 10 \\ 2 & 5 \end{bmatrix}$ and X – Y = $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$
6.	If A = $\begin{bmatrix} 4 & -1 \\ -2 & 3 \end{bmatrix}$ and B = $\begin{bmatrix} -1 & 2 \\ 3 & -4 \end{bmatrix}$ find matrix X such that 2A – B + X = 0.
7.	If A = $\begin{bmatrix} 2 & 1 \\ 3 & -1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & -2 \\ -1 & -3 \end{bmatrix}$ find matrix X such that A + 3B + X is a unit matrix.
8.	Find matrix X such that 3X – 2A + 5B = 0, where A = $\begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 2 \\ 3 & 0 \end{bmatrix}$
9.	Find matrix X such that 2X – 3A = B where A = $\begin{bmatrix} -1 & 0 & 2 \\ 1 & 2 & -1 \\ 2 & 1 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} 1 & 2 & 1 \\ 0 & -1 & 3 \\ 4 & 1 & 6 \end{bmatrix}$
10.	If P = $\begin{bmatrix} 2 & -1 \\ -4 & 3 \end{bmatrix}$, find $P^2 - 3P + 2I$
11.	If A = $\begin{bmatrix} 6 & 9 \\ -4 & -6 \end{bmatrix}$, show that $A^2 = 0$.

12.	If A = $\begin{bmatrix}1 & -2 & 3\\2 & -4 & 1\\3 & -5 & 0\end{bmatrix}$ find $A^2 - 3A - 2I$.
13.	If A = $\begin{bmatrix}2 & 4 & 6\\5 & 3 & 1\end{bmatrix}$ and B = $\begin{bmatrix}1 & 2 & 3\\6 & 5 & 4\end{bmatrix}$, find 3A – 2B.
14.	If A = $\begin{bmatrix}2 & -1\\6 & 3\end{bmatrix}$, B = $\begin{bmatrix}-4 & 7\\1 & 0\end{bmatrix}$ and I is the identity matrix of order 2 then find 6A – 3B + 2I.
15.	If A = $\begin{bmatrix}9 & 1\\4 & 3\end{bmatrix}$, B = $\begin{bmatrix}1 & 5\\7 & 13\end{bmatrix}$, find matrix X such that 3A + 5B + 2X = 0.
16.	If A = $\begin{bmatrix}2 & -1 & 3\\4 & 2 & 0\\-2 & 7 & 3\end{bmatrix}$, B = $\begin{bmatrix}6 & -2 & 7\\8 & 0 & 9\\3 & 1 & -5\end{bmatrix}$ find matrix X such that 2A + 3X = 5B.
17.	If A = $\begin{bmatrix}-2 & 0\\1 & 3\end{bmatrix}$, B = $\begin{bmatrix}3 & 5\\-7 & 2\end{bmatrix}$, find matrix X such that 2A – 3B + 5X = 0.
18.	If A = $\begin{bmatrix}1 & -1\\-2 & 2\end{bmatrix}$ find $A^2 - 3A$.
19.	If A = $\begin{bmatrix}3 & 1 & 4\\2 & -1 & -6\end{bmatrix}$, B = $\begin{bmatrix}2 & 0\\0 & 2\end{bmatrix}$ then prove that B x A = 2A.
20.	If A = $\begin{bmatrix}2 & -2 & -4\\-1 & 3 & 4\\1 & -2 & -3\end{bmatrix}$ show that $A^2 = A$.
21.	If A = $\begin{bmatrix}11 & 2 & 6\\1 & 2 & -5\end{bmatrix}$, B = $\begin{bmatrix}0 & 1 & 8\\2 & 3 & 6\end{bmatrix}$ then verify that i. A + B = B + A ii. 5(A – B) = 5A – 5B
22.	If A = $\begin{bmatrix}1 & -2\\4 & 3\end{bmatrix}$ and B = $\begin{bmatrix}2 & 6\\7 & -3\end{bmatrix}$ then show that $AB \neq BA$.
23.	If A = $\begin{bmatrix}1 & -2 & 3\\2 & -4 & 1\\3 & -5 & 0\end{bmatrix}$ find the matrix $3A^2 - 2A + 5I$.
24.	If A = $\begin{bmatrix}2 & -1\\1 & 3\end{bmatrix}$, find the matrix $A^2 + 3A - 5I$.
25.	Find the inverse, if it exists, of the matrix : i. $\begin{bmatrix}2 & 5\\1 & 3\end{bmatrix}$ ii. $\begin{bmatrix}5 & 6\\3 & 4\end{bmatrix}$ iii. $\begin{bmatrix}2 & 6\\7 & -3\end{bmatrix}$ iv. $\begin{bmatrix}2 & 5\\1 & 3\end{bmatrix}$

	v. $\begin{bmatrix} 4 & -1 \\ -3 & 2 \end{bmatrix}$ vi. $\begin{bmatrix} 3 & 2 \\ 6 & -2 \end{bmatrix}$ vii. $\begin{bmatrix} 2 & 3 & 1 \\ 3 & 4 & 1 \\ 3 & 7 & 2 \end{bmatrix}$ viii. $\begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ 3 & 5 & 9 \end{bmatrix}$ ix. $\begin{bmatrix} 1 & 2 & 5 \\ 1 & 3 & 5 \\ 1 & 5 & 12 \end{bmatrix}$ x. $\begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$
26.	Show that the matrix A = $\begin{bmatrix} 3 & 4 \\ 2 & 5 \end{bmatrix}$ satisfies the equation $A^2 - 8A + 7I = 0$. Hence find A^{-1}.
27.	Find matrix A such that A $\begin{bmatrix} 0 & 1 \\ 2 & -1 \end{bmatrix} = \begin{bmatrix} 2 & 1 \\ -1 & 0 \end{bmatrix}$
28.	Show that the matrix A = $\begin{bmatrix} 4 & -1 \\ -3 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 6A + 5I = 0$. Hence find A^{-1}.
29.	Show that the matrix A = $\begin{bmatrix} 1 & 3 \\ 0 & 3 \end{bmatrix}$ satisfies the equation $A^2 - 4A + 3I = 0$. Hence find A^{-1}.
30.	Show that the matrix A = $\begin{bmatrix} 2 & 1 \\ 4 & 1 \end{bmatrix}$ satisfies the equation $A^2 - 3A - 2I = 0$. Hence find A^{-1}.
31.	Show that the matrix A = $\begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 4A + 3I = 0$. Hence find A^{-1}.
32.	Show that the matrix A = $\begin{bmatrix} 3 & -1 \\ 1 & 2 \end{bmatrix}$ satisfies the equation $A^2 - 5A + 7I = 0$. Hence find A^{-1}.
33.	Find matrix A such that A $\begin{bmatrix} 3 & 4 \\ 6 & 2 \end{bmatrix} = \begin{bmatrix} 2 & 8 \\ 9 & 4 \end{bmatrix}$
34.	Find matrix X such that $\begin{bmatrix} 5 & 4 \\ 1 & 1 \end{bmatrix} X = \begin{bmatrix} 1 & -2 \\ 1 & 3 \end{bmatrix}$
35.	Find the value of following determinants : i. $\begin{vmatrix} 2 & 3 \\ 5 & 4 \end{vmatrix}$ ii. $\begin{vmatrix} 9 & 2 \\ -1 & 3 \end{vmatrix}$ iii. $\begin{vmatrix} 2 & 1 \\ 4 & -6 \end{vmatrix}$ iv. $\begin{vmatrix} -1 & -2 \\ -3 & -4 \end{vmatrix}$ v. $\begin{vmatrix} 3 & -1 \\ 2 & -4 \end{vmatrix}$ vi. $\begin{vmatrix} 3 & -1 \\ 4 & 6 \end{vmatrix}$ vii. $\begin{vmatrix} -1 & 3 \\ -1 & 3 \end{vmatrix}$ viii. $\begin{vmatrix} 4 & -1 \\ -1 & 3 \end{vmatrix}$
36.	Expand following determinants to find the value : i. $\begin{vmatrix} 1 & 3 & 5 \\ 2 & 1 & 4 \\ 6 & 2 & 3 \end{vmatrix}$ ii. $\begin{vmatrix} 1 & 3 & 2 \\ 2 & 1 & 3 \\ 3 & 2 & 1 \end{vmatrix}$ iii. $\begin{vmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \\ 4 & 6 & 8 \end{vmatrix}$ iv. $\begin{vmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 9 & 7 & 5 \end{vmatrix}$ v. $\begin{vmatrix} 2 & 3 & -4 \\ -1 & 2 & 7 \\ 9 & -5 & 6 \end{vmatrix}$ vi. $\begin{vmatrix} -2 & -3 & 4 \\ 1 & -2 & -7 \\ -9 & 5 & -6 \end{vmatrix}$

37.	Solve using Cramer's rule : i. x + 2y = 4, x – 3y = -1. ii. 5x – y = 2, 2x + y = 5. iii. x – 2y = 8, 2x + 3y = 2. iv. 2x + y = 1, x + 2y = 8. v. 3x + y = 4, 2x – 2y = 8. vi. x – y = 12, x + 2y = 3. vii. 5x + 2y = 9, 8x – y = 6. viii. 5x + 3z – 2y = 9, 3x + 4y = 10 – 2z, x + y + z = 2. ix. 3x – y – 4z = 5, x + y + z = 0, 2x + y + 3z = 4. x. x + 2y + z = 6, 2x – 3y + z =1, -x + 2y – 2z = 5. xi. x + 2y + 2z =1, 2x + 3y + 4z = 4, -x + y + 3z = -2. xii. 2x + y – z = 0, x + y + z= 9, 2x + 5y + 7z = 52. xiii. x – 8y –z = 2, 2x – 6y + 2z = 10, 3x + y + 3z = 5. xiv. 7x + 3y + z = 11, 2x – y + 3z = 4, x + y + z = 3. xv. 2x + y + z = 7, 3x – y – z = -2, x + 2y -3z = -4. xvi. x + y + z – 7 = 0, x + 2y + 3z – 16 = 0, x + 3y + 4z -22 = 0. xvii. 3x + 3y – z = 11, 2x – y + 2z = 9, 4x + 3y + 2z = 25.
38.	A. Without expansion, find the value of following determinants : i. $\begin{vmatrix} 34 & 36 & 38 \\ 54 & 56 & 58 \\ 68 & 72 & 76 \end{vmatrix}$ ii. $\begin{vmatrix} 34 & 36 & 38 \\ 54 & 56 & 58 \\ 84 & 86 & 88 \end{vmatrix}$ iii. $\begin{vmatrix} 55 & 24 & 48 \\ 65 & 26 & 52 \\ 85 & 34 & 68 \end{vmatrix}$ iv. $\begin{vmatrix} 0 & -47 & 137 \\ 57 & 0 & 287 \\ -137 & -287 & 0 \end{vmatrix}$ v. $\begin{vmatrix} 101 & 102 & 103 \\ 104 & 105 & 106 \\ 107 & 108 & 109 \end{vmatrix}$ vi. $\begin{vmatrix} 23 & 35 & 48 \\ 20 & 30 & 40 \\ 3 & 5 & 8 \end{vmatrix}$ vii. $\begin{vmatrix} 48 & 60 & 96 \\ 50 & 53 & 101 \\ 56 & 70 & 112 \end{vmatrix}$ viii. $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix}$ B. Evaluate : i. $\begin{vmatrix} 1 & a & b+c \\ 1 & b & c+a \\ 1 & c & a+b \end{vmatrix}$ ii. $\begin{vmatrix} 1^2 & 2^2 & 3^2 & 4^2 \\ 2^2 & 3^2 & 4^2 & 5^2 \\ 3^2 & 4^2 & 5^2 & 6^2 \\ 4^2 & 5^2 & 6^2 & 7^2 \end{vmatrix}$
39.	Explain properties of determinants with example.
40.	Using properties of determinants, show that $\begin{vmatrix} 1 & 1 & a \\ 1 & a & a^2 \\ 1 & a^2 & a^3 \end{vmatrix}$ = 0.

41.	Without expanding the determinant, show that : i. $\begin{vmatrix} 0 & a & b \\ -a & 0 & c \\ -b & -c & 0 \end{vmatrix} = 0.$ ii. $\begin{vmatrix} 0 & a & -b \\ -a & 0 & -a \\ b & a & 0 \end{vmatrix} = 0.$ iii. $\begin{vmatrix} 1 & -a & b+c \\ 1 & -b & c+a \\ 1 & -c & a+b \end{vmatrix} = 0.$ iv. $\begin{vmatrix} 0 & x-y & y-z \\ y-x & 0 & z-x \\ z-y & x-z & 0 \end{vmatrix} = 0.$
42.	Solve the following to find the values of x : i. $\begin{vmatrix} 1 & 1 & 1 \\ 1 & x & 1 \\ 1 & 1 & x \end{vmatrix} = 0.$ ii. $\begin{vmatrix} 1 & 1 & 1 \\ a & x & a \\ b & b & x \end{vmatrix} = 0.$ iii. $\begin{vmatrix} 1 & 2 & 4 \\ 3 & x+6 & 2x+12 \\ 1 & 1 & 1 \end{vmatrix} = 0.$ iv. $\begin{vmatrix} 1 & 6 & 2 \\ 2 & 2x+16 & x+5 \\ 7 & 43 & 15 \end{vmatrix} = 0.$ v. $\begin{vmatrix} 2 & 4 & 6 \\ 3 & 2x+4 & 103 \\ 4 & 8 & x+6 \end{vmatrix} = 0.$ vi. $\begin{vmatrix} x & -6 & -1 \\ 2 & -3x & x-3 \\ -3 & 2x & x+2 \end{vmatrix} = 0.$
43.	If A+B = $\begin{bmatrix} 7 & 0 \\ 2 & 5 \end{bmatrix}$ and A – B = $\begin{bmatrix} 3 & 0 \\ 0 & 3 \end{bmatrix}$, find A and B.
44.	Find a matrix A such that 2A -3B +5C = 0 where B = $\begin{bmatrix} -2 & 2 & 0 \\ 3 & 1 & 4 \end{bmatrix}$ and C = $\begin{bmatrix} 2 & 0 & -2 \\ 7 & 1 & 6 \end{bmatrix}$

45.	If A = $\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ and B = $\begin{bmatrix} a & b \\ 3 & 5 \end{bmatrix}$ find a and b such that AB = BA. Also compute 3A+5B.
46.	Express A as sum of symmetric and skew symmetric matrices : i. A = $\begin{bmatrix} 3 & 4 & -3 \\ 6 & -3 & 0 \\ 0 & 8 & -4 \end{bmatrix}$ ii. A = $\begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ 3 & 5 & 9 \end{bmatrix}$ iii. A = $\begin{bmatrix} -1 & 7 & 1 \\ 2 & 3 & 4 \\ 5 & 0 & 5 \end{bmatrix}$
47.	Find rank of following matrices by reducing to row echelon form : i. $\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ ii. $\begin{bmatrix} 2 & -2 \\ 5 & -5 \end{bmatrix}$ iii. $\begin{bmatrix} 2 & 3 & 4 \\ 1 & 2 & 3 \\ 3 & 5 & 9 \end{bmatrix}$ iv. $\begin{bmatrix} 1 & 1 & 0 \\ 1 & 2 & -1 \\ 2 & 3 & 1 \end{bmatrix}$ v. $\begin{bmatrix} 2 & 3 & 1 \\ 5 & 6 & 2 \\ 1 & 2 & -1 \end{bmatrix}$ vi. $\begin{bmatrix} 1 & 3 & 4 & 3 \\ 3 & 9 & 12 & 9 \\ 1 & 3 & 4 & 0 \end{bmatrix}$ vii. $\begin{bmatrix} 3 & 1 & 0 & 3 \\ 1 & -1 & 2 & 1 \\ 1 & 1 & -1 & 1 \end{bmatrix}$ viii. $\begin{bmatrix} 1 & 2 & -1 & 4 \\ 3 & 2 & 4 & -5 \\ 6 & 2 & 1 & 3 \end{bmatrix}$ ix. $\begin{bmatrix} 1 & 2 & 3 & -2 \\ 3 & 0 & 4 & 1 \\ 2 & -2 & 1 & 3 \end{bmatrix}$ x. $\begin{bmatrix} 2 & 3 & 4 & 5 \\ 6 & 2 & 1 & 3 \\ 3 & 1 & -1 & 2 \\ 0 & 0 & 2 & 5 \end{bmatrix}$ xi. $\begin{bmatrix} 6 & 1 & 3 & 8 \\ 9 & 3 & 9 & 7 \\ 3 & 2 & 6 & -1 \\ 15 & 4 & 12 & 15 \end{bmatrix}$ xii. $\begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -4 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ xiii. $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$
48.	If A = $\begin{bmatrix} 2 & 3+2i & -4 \\ 3-2i & 5 & 6i \\ -4 & -6i & 3 \end{bmatrix}$ then show that A is Hermitian and iA is Skew-Hermitian.
49.	Show that following matrices are Hermitian: i. A = $\begin{bmatrix} 2 & 3+4i \\ 3-4i & 5 \end{bmatrix}$ ii. $\begin{bmatrix} 2 & 3-i & 4 \\ 3+i & 4 & 1+3i \\ 4 & 1-3i & 1 \end{bmatrix}$
50.	Show that A = $\begin{bmatrix} \frac{1}{\sqrt{2}} & 0 & \frac{1}{\sqrt{2}} \\ 0 & 1 & 0 \\ \frac{1}{\sqrt{2}} & 0 & \frac{-1}{\sqrt{2}} \end{bmatrix}$ is orthogonal matrix.
51.	Prove that following matrices are orthogonal and hence find A^{-1} : i. A = $\frac{1}{3}\begin{bmatrix} -1 & 2 & 2 \\ 2 & -1 & 2 \\ 2 & 2 & -1 \end{bmatrix}$ ii. A = $\frac{1}{9}\begin{bmatrix} 1 & 4 & 8 \\ 8 & -4 & 1 \\ -4 & -7 & 4 \end{bmatrix}$
52.	Examine for consistency of following equations and solve them if found consistent : (Refer to Q.37)
53.	Examine linear dependence or independence of vectors : i. (1, 2, 3), (3, -2, 1), (1, -6, -5) ii. (-1, 5, 0), (16, 8, -3), (-64, 56, 9)

	iii. (1, -1, 1), (2, 1, 1), (3, 0, 2) iv. (1, 1, 1, 3), (1, 2, 3, 4), (2, 3, 4, 7) v. (2, 2, 7, -7), (3, -1, 2, 4), (1, 1, 3, 1) vi. (2, -1, 3, 2), (1, 3, 4, 2), (3, -5, 2, 2) vii. (1, 3, 5), (4, 8, 11) viii. (1, 2, 3), (3, 5, 0), (1, 0, 5) ix. (2, 4, 6), (3, -2, 1), (1, -6, -5) x. (4, 5, 6), (2, 1, -2), (1, 3, 2) xi. (1, 2, 3), (3, -3, 0) xii. (1, 3, 4, 2), (3, -5, 2, 2), (2, -1, 3, 2)

UNIT 2:

1.	Find characteristic roots of : i. $\begin{bmatrix} 1 & 4 \\ 2 & 3 \end{bmatrix}$ ii. $\begin{bmatrix} 5 & 6 \\ 1 & 2 \end{bmatrix}$ iii. $\begin{bmatrix} 1 & 3 \\ 5 & 7 \end{bmatrix}$ iv. $\begin{bmatrix} 4 & 6 \\ 1 & 3 \end{bmatrix}$ v. $\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$ vi. $\begin{bmatrix} 2 & 4 & 6 \\ 1 & 2 & 3 \\ 3 & 6 & 9 \end{bmatrix}$
2.	Find Eigen values and eigen vectors of : i. $\begin{bmatrix} 1 & 2 & 3 \\ 0 & -4 & 2 \\ 0 & 0 & 7 \end{bmatrix}$ ii. $\begin{bmatrix} 13 & -3 & 5 \\ 0 & 4 & 0 \\ -15 & 9 & -7 \end{bmatrix}$ iii. $\begin{bmatrix} 3 & 1 & 0 \\ 0 & 3 & 1 \\ 0 & 0 & 3 \end{bmatrix}$ iv. $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$
3.	Verify Cayley-Hamilton theorem and hence find A^{-1} for : i. $\begin{bmatrix} 3 & 0 \\ -1 & 2 \end{bmatrix}$ ii. $\begin{bmatrix} 4 & 6 \\ 1 & 3 \end{bmatrix}$ iii. $\begin{bmatrix} 2 & 5 \\ 0 & 6 \end{bmatrix}$ iv. $\begin{bmatrix} 8 & 0 \\ 1 & 9 \end{bmatrix}$ v. $\begin{bmatrix} 3 & 2 \\ 4 & 1 \end{bmatrix}$ vi. $\begin{bmatrix} 11 & -4 & -7 \\ 7 & -2 & -5 \\ 10 & -4 & -6 \end{bmatrix}$ vii. $\begin{bmatrix} 2 & 1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$
4.	Diagonalise matrix A : i. $\begin{bmatrix} 3 & 1 & 4 \\ 2 & 2 & 4 \\ 4 & 1 & 3 \end{bmatrix}$ ii. $\begin{bmatrix} 3 & 2 & 4 \\ 2 & 0 & 2 \\ 4 & 2 & 3 \end{bmatrix}$ iii. $\begin{bmatrix} 3 & -1 & 1 \\ -1 & 5 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ iv. $\begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$ v. $\begin{bmatrix} 1 & -3 \\ -4 & 5 \end{bmatrix}$ vi. $\begin{bmatrix} 1 & 3 \\ 3 & 1 \end{bmatrix}$. Hence find A^4.
5.	If A = $\begin{bmatrix} 1 & 3 & 0 \\ 3 & -2 & 1 \\ 0 & -1 & 1 \end{bmatrix}$ find characteristic values of A, 3A, A^2, A^4, A^{-1}.