1 If $A = \begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ then $AB =$

(a) $\begin{bmatrix} 4 & 6 \\ -4 & -6 \end{bmatrix}$ (b) $\begin{bmatrix} 6 & 4 \\ -6 & -4 \end{bmatrix}$ (c) $\begin{bmatrix} 6 & 4 \\ 4 & -6 \end{bmatrix}$ (d) None

2 last step of Gauss-elimination method which is echelon form is $\left[\begin{array}{ccc|c} a_{11} & a_{12} & a_{13} & b_1 \\ 0 & a_{21} & a_{23} & b_2 \\ 0 & 0 & a_{33} & b_3 \end{array}\right]$ have unique solution if

(a) $a_{33} \neq 0$ (b) $a_{33} = 0$ (c) $a_{33} = 0$ $b_3 \neq 0$ (d) None

3 The rank of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$ is

(a) 2 (b) 3 (c) 1 (d) None

4 The system of eq^n in matrix form is $AX = b$ if $b = 0$ then the system is

(a) homogeneous eq^n (b) non-homogeneous eq^n (c) none

5 value of the determinant $\begin{vmatrix} \cos\alpha & \sin\alpha \\ -\sin\alpha & \cos\alpha \end{vmatrix}$ is

(a) 2 (b) 3 (c) 1 (d) None

6 value of the eq^n $x+y=3$, $2x+y=4$ is

(a) $x=1$ $y=2$ (b) $x=2$ $y=1$ (c) $x=2$ $y=2$ (d) None

7 Inverse of matrix $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ is

(a) $\begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 \\ 1 & 1 \end{bmatrix}$ (c) $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ (d) None

8 The value of $(A^{-1})^{-1}$ is

(a) A^{-1} (b) A (c) I (d) None

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

(a) 0 & 5 (b) 0 & 4 (c) 1 & 0 (d) None

10 If $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ is a Eigen vector then its corresponding Normalized eigen vector is

(a) $\begin{bmatrix} \frac{1}{2} \\ 1 \end{bmatrix}$ (b) $\begin{bmatrix} \frac{1}{\sqrt{5}} \\ \frac{2}{\sqrt{5}} \end{bmatrix}$ (c) $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$ (d) None

11 If $A = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ then its eigen vectors are

(a) $\begin{bmatrix} 1 \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ (b) $\begin{bmatrix} 0 \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ (c) $\begin{bmatrix} 1 \\ 0 \end{bmatrix} \begin{bmatrix} 0 \\ 1 \end{bmatrix}$ (d) None

12 If $A = \begin{bmatrix} 0 & a \\ a & 0 \end{bmatrix}$ then eigen value are

(a) ± 1 (b) $\pm a$ (c) ± 2 (d) None

13 A real square matrix A is symmetric if

(a) $A = \bar{A}^T$ (b) $A^T = \bar{A}^T$ (c) $A^T = A$ (d) None

14 A real square matrix A is skew symmetric if

(a) $A = \bar{A}^T$ (b) $A^T = -A$ (c) $A^T = A$ (d) None

15 A real square matrix A is orthogonal if

(a) $A = \bar{A}^T$ (b) $AA^T = A^{-1}$ (c) $A^T = \bar{A}^T$ (d) None

16 For a skew symmetric matrix all entries in the principal diagonal are

(a) 1 (b) 0 (c) 2 (d) None

17 A complex square matrix A is said to be Hermitian if

(a) $(\bar{A})^T = \bar{A}$ (b) $(\bar{A})^T = A$ (c) $(\bar{A})^T = A^T$ (d) None

18 A complex square matrix A is said to be skew-Hermitian if (a) $(\bar{A})^T = -A$ (b) $(\bar{A})^T = -\bar{A}$ (c) $(\bar{A})^T = -A^T$ (d) None

19 A complex square matrix A is unitary if

(a) $A(\bar{A})^T = A^T$ (b) $A(\bar{A})^T = \bar{A}$ (c) $A(\bar{A})^T = A$ (d) None

20 Hermitian form of a matrix is always

(a) 0 (b) purely imaginary (c) real (d) None

21 Skew Hermitian form of a matrix is always

(a) real (b) 0 or purely imaginary (c) only imaginary (d) None

22 If $\bar{A}$ is similar to A then eigen value of A & $\bar{A}$ are

(a) same (b) different (c) 0 (d) None

23 If $\lambda_1, \lambda_2, \ldots \lambda_n$ are distinct eigen values of an $n \times n$ matrix A then corresponding eigen vectors are
(a) Linearly independent (b) linearly dependent (c) None

24 In an $n \times n$ matrix A $D = X^{-1} A X$ is the diagonal matrix then diagonal entries are
(a) eigen vector of A (b) eigen values of A (c) None

25 the conic sections represented by the quadratic form $-11x^2 + 84xy + 24y^2 = 156$ is
(a) ellipse (b) parabola (c) Hyperbola (d) None

26 Grad $f = xy$ at point $P(1,1)$ is
(a) $\hat{i} + \hat{j}$ (b) $\hat{i} - \hat{j}$ (c) $\hat{i} - \hat{j}$ (d) None

27 The D.D. of $f = x^2 + y^2$ at the point $P:(1,1)$ in the direction of vector $\vec{a} = 2\hat{i} - 4\hat{j}$ is
(a) $\frac{-2}{\sqrt{5}}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{-4}{\sqrt{5}}$ (d) None

28 If $\vec{V} = x\hat{i} + y\hat{j} + z\hat{k}$ then div $\vec{V}$ is
(a) 1 (b) 2 (c) 3 (d) None

29 If $\vec{V} = (2y, 5x, 0)$ then curl $\vec{V}$ is
(a) $3\hat{k}$ (b) $3\hat{j}$ (c) $3\hat{k}$ (d) None

30 velocity vector $\vec{V} = (2y^2, 0, 0)$ the fluid is
(a) irrotational (b) rotational (c) None

31 the velocity vector $\vec{V} = x^2\hat{k}$ then motion of fluid is
(a) compressible (b) incompressible (c) None

32 Formula for work done by a force is
(a) ma (b) F.d (c) f.a (d) None

33 Path is independent if
(a) div $F = 0$ (b) curl $f = 0$ (c) grad $f = 0$ (d) None

34 $\int_0^2 \int_0^4 (x^2 + y^2)\, dx\, dy$ equal to
(a) $\frac{150}{3}$ (b) $\frac{155}{3}$ (c) $\frac{160}{3}$ (d) None

35 Eqn of a line passing through $(0,0)$ and $(\frac{b}{2}, 1)$ is

(a) $y = \frac{bx}{2}$ (b) $x = \frac{by}{2}$ (c) $y = x$ (d) none

36 Formula $z = \sqrt{x^2+y^2}$ is represent

(a) sphere (b) cone (c) cylinder (d) none

37 If $\vec{r}(u,v) = u\vec{i} + v\vec{j}$ then $\vec{n}$ is

(a) $\vec{i}$ (b) $\vec{j}$ (c) $\vec{k}$ (d) None

38 Eqn $3x+4y+6z = 24$ represent

(a) plane (b) cylinder (c) cone (d) none

39 $f(x) = x/x$ is

(a) odd function (b) even function (c) neither even nor odd (d) no

40 $f(x) = |x|$ is

(a) odd function (b) even fuction (c) neither odd nor even (d) none

41 Fundamental period of $\cos 2x$ is

(a) 2π (b) $\frac{\pi}{4}$ (c) π (d) none

42 Fundamental period of $\sin \frac{2\pi n x}{k}$ is

(a) k (b) $\frac{2\pi}{n}$ (c) $\frac{k}{n}$ (d) none

43 $f(x)$ is a period p if any $a \neq 0$ has period

(a) pa (b) p/a (c) a/p (d) none

44 $f(x)$ is a period p $f(x/b)$ $b \neq 0$ has period

(a) b/p (b) bp (c) p/b (d) None

45 $f(x) = x$ $(-\pi < x < \pi)$ then a_0 is equal to

(a) 1 (b) 0 (c) $\frac{1}{2}$ (d) none

46 $f(x) = |x|$ $-2 < x < 2$ in value will be

(a) 1 (b) 2 (c) 0 (d) none

47 Period of $2L$, $\frac{2L}{2}$, $\frac{2L}{3}$, $\frac{2L}{4}$ is

(a) $2L$ (b) $\frac{2L}{2}$ (c) $\frac{2L}{3}$ (d) none

48 The given vectors $[2\ -4]$, $[0\ 9]$, $[3\ 5]$ are
(a) L.D. (b) L.I. (c) None

49 The rank of the matrix $\begin{bmatrix} 8 & -4 \\ -2 & 1 \\ 6 & -3 \end{bmatrix}$ is
(a) 2 (b) 1 (c) 3 (d) None

50 echelon form of the matrix $\begin{bmatrix} 8 & -4 \\ 6 & -3 \end{bmatrix}$ is
(a) $\begin{bmatrix} 6 & -3 \\ 0 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & -4 \\ 0 & 3 \end{bmatrix}$ (c) $\begin{bmatrix} 8 & -4 \\ 0 & 0 \end{bmatrix}$ (d) None

51 The matrix $A = \begin{bmatrix} .96 & -.28 \\ .28 & .96 \end{bmatrix}$ is
(a) symmetric matrix (b) skew symmetric matrix (c) orthogonal (d) none

52 The determinant of an orthogonal matrix has the value
(a) ± 1 (b) ± 2 (c) ± 3 (d) None

53 The matrix $A = \begin{bmatrix} 2 & 3+4i \\ 3-4i & 2 \end{bmatrix}$ is
(a) Hermitian (b) Skew Hermitian (c) unitary (d) None

54 The determinant of a unitary matrix has absolute value
(a) 2 (b) 3 (c) 1 (d) none

55 Symmetric coefficient matrix C of the quadratic form $Q = 4x^2 - 8xy + 5y^2$ is
(a) $\begin{bmatrix} 4 & -4 \\ -4 & 5 \end{bmatrix}$ (b) $\begin{bmatrix} 2 & -4 \\ -4 & 5 \end{bmatrix}$ (c) $\begin{bmatrix} 4 & 5 \\ 4 & -4 \end{bmatrix}$ (d) None

56 Orthonormal basis of eigenvector $\begin{bmatrix} i \\ 1 \end{bmatrix}$ is
(a) $\begin{bmatrix} i \\ 1 \end{bmatrix}$ (b) $\begin{bmatrix} \frac{i}{\sqrt{2}} \\ \frac{1}{\sqrt{2}} \end{bmatrix}$ (c) $\begin{bmatrix} 0 \\ 1 \end{bmatrix}$ (d) None

57 Potential at the point (3,4) for the field $\vec{F} = 9x^2 + y^2$ is (a) 25 (b) 100 (c) 90 (d) none

58 $9x^2 + 4y^2 = c$ represents

(a) Concentric ellipses (b) Concentric parabolas (c) none

59 $\tan^{-1}\frac{y}{x} = k$ represents

(a) Concentric circle (b) family of straight lines (c) none

60 $x^2 - y^2 = c^2$ represents

(a) family of lines (b) family of ellipse (c) rectangular hyperbola (d) none

61 $\frac{1}{r} = \frac{1}{r^2} - 2$ represent

(a) Conic (b) ellipse (c) parabola (d) none

62 A fluid flow is irrotational if

(a) $\operatorname{div}\vec{V} = 0$ (b) $\operatorname{curl}\vec{V} = 0$ (c) none

63 A fluid flow is incompressible if

(a) $\operatorname{curl}\vec{V} = 0$ (b) $\operatorname{div}\vec{V} = 0$ (c) none

64 If $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 2 \\ 3 & x \end{bmatrix}$ $A = B$ then $x =$

(a) 1 (b) 2 (c) 3 (d) none

65 Additive inverse of $A = \begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix}$ is

(a) $\begin{bmatrix} -1 & 1 \\ -2 & -3 \end{bmatrix}$ (b) $\begin{bmatrix} -1 & 1 \\ 2 & 3 \end{bmatrix}$ (c) $\begin{bmatrix} -1 & 1 \\ -2 & -3 \end{bmatrix}$ (d) none

66 $A = \begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ $B = \begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix}$ then $AB =$

(a) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 1 \\ -1 & -1 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$ (d) none

67 If $A = \begin{bmatrix} 1 & 2 \\ u & v \end{bmatrix}$ then $A^T =$

(a) $\begin{bmatrix} 1 & v \\ 2 & u \end{bmatrix}$ (b) $\begin{bmatrix} 1 & u \\ 2 & v \end{bmatrix}$ (c) $\begin{bmatrix} u & v \\ 1 & 2 \end{bmatrix}$ (d) None

68 Solution of system of eq^n $6x+4y=2$ and $3x-5y=-34$ is

(a) $x=3$ $y=5$ (b) $x=-3$ $y=5$ (c) None

69 The rank of the matrix $\begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ is

(a) 2 (b) 3 (c) 1 (d) None

70 The vectors $\begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$ $\begin{bmatrix} 1 \\ 1 \\ 0 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$ are

(a) linearly dependent (b) linearly independent (c) None

71 The value of the determinant $\begin{vmatrix} 2 & 3 \\ 5 & 7 \end{vmatrix}$ is

(a) -1 (b) 1 (c) 2 (d) None

72 $\begin{vmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{vmatrix}$ is a determinant of order

(a) 1st (b) 2nd (c) 3rd (d) None

73 Eigen value of the matrix $\begin{bmatrix} 0 & 3 \\ -3 & 0 \end{bmatrix}$ is

(a) $\pm 3i$ (b) $\pm 2i$ (c) $\pm i$ (d) None

74 $A = \begin{bmatrix} a & b \\ -b & a \end{bmatrix}$ A is skew symetric if

(a) $a=1$ (b) $a=2$ (c) $a=0$ (d) None

75 $f(x) = x \cos nx$ is

(a) odd function (b) even function (c) None

76 $f(x) = \cosh x$ is a

(a) even function (b) odd function (c) None

77 Period of $\cos \frac{2\pi x}{k}$ is

(a) $\frac{1}{k}$ (b) k (c) $2k$ (d) None

77 $\int_{-\pi}^{\pi} \sin x \, dx =$

(a) 1 (b) $\frac{\pi}{2}$ (c) 0 (d) None

78 For even function fourier coefficients

(a) $a_0 = 0$ (b) $a_n = 0$ (c) $b_n = 0$ (d) None

80 For odd function fourier coefficient

(a) $a_0 = 0$ $a_n = 0$ (b) $a_0 = 0$ $a_n \neq 0$ (c) $b_n = 0$ (d) None

81 Rank of the matrix $\begin{bmatrix} 4 & 3 \\ -8 & -6 \end{bmatrix}$ is

(a) 2 (b) 3 (c) 1 (d) None

82 Solution of the system of eqn $5x - 3y = 37$ and $-2x + 7y = -38$ are

(a) $x = 5$ $y = 4$ (b) $x = 5$ $y = -4$ (c) $x = -5$, $y = 4$ (d) None

83 Normalized basis of eigen vector $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ is

(a) $\begin{bmatrix} \frac{1}{\sqrt{5}} \\ \frac{2}{\sqrt{5}} \end{bmatrix}$ (b) $\begin{bmatrix} \frac{1}{\sqrt{5}} \\ \frac{2}{\sqrt{5}} \end{bmatrix}$ (c) $\begin{bmatrix} 2 \\ 1 \end{bmatrix}$ (d) None

84 The matrix $\begin{bmatrix} -3 & 1 & 5 \\ 1 & 0 & -2 \\ 5 & -2 & 4 \end{bmatrix}$ is

(a) Symmetric (b) Skew-symmetric (c) orthogonal (d) None

85 The matrix $\begin{bmatrix} 0 & 9 & -12 \\ -9 & 0 & 20 \\ 12 & -20 & 0 \end{bmatrix}$ is

(a) Symmetric (b) Skew-symmetric (c) orthogonal (d) None

86 The matrix $\begin{bmatrix} \frac{2}{3} & \frac{1}{3} & \frac{2}{3} \\ -\frac{2}{3} & \frac{2}{3} & \frac{1}{3} \\ \frac{1}{3} & \frac{2}{3} & -\frac{2}{3} \end{bmatrix}$ is

(a) Symmetric (b) Skew-symmetric (c) orthogonal (d) None

87 The matrix $A = \begin{bmatrix} 4 & 1-3i \\ 1+3i & 7 \end{bmatrix}$ is

(a) Hermitian (b) Skew-Hermitian (c) unitary (d) None

88 The matrix $B = \begin{bmatrix} 3i & 2+i \\ -2+i & -i \end{bmatrix}$ is

(a) Hermitian (b) Skew-Hermitian (c) unitary (d) none

89 The matrix $C = \begin{bmatrix} \frac{1}{2}i & \frac{1}{2}\sqrt{3} \\ \frac{1}{2}\sqrt{3} & \frac{1}{2}i \end{bmatrix}$ is

(a) Hermitian (b) Skew-Hermitian (c) unitary (d) None

90 the eigen value of symmetric matrix are

(a) real (b) imaginary (c) None

91 the eigen value of skew symmetric matrix are

(a) pure imaginary or zero (b) real (c) none

92 the eigen value of Hermitian matrix are

(a) imaginary (b) real (c) none

93 The eigen value of skew-Hermitian matrix are

(a) pure imaginary or zero (b) real (c) N are

94 $\|a\| =$

(a) $\sqrt{a^T \cdot a}$ (b) $\sqrt{a \cdot a}$ (c) none

95 $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$ $P = \begin{bmatrix} 1 & 3 \\ 3 & 6 \end{bmatrix}$ $\bar{A} = \bar{P}'AP$ value is

(a) $\begin{bmatrix} 0 & 0 \\ \frac{7}{3} & 5 \end{bmatrix}$ (b) $\begin{bmatrix} \frac{7}{3} & 5 \\ 0 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 5 \\ \frac{7}{3} & 0 \end{bmatrix}$ (d) None

96 Diagonalize vector of $\begin{bmatrix} 2 & 1 \\ 2 & 1 \end{bmatrix}$ is

(a) $\begin{bmatrix} 0 & 2 \\ 0 & 0 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 0 \\ 0 & 3 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 0 \\ 0 & 2 \end{bmatrix}$ (d) None

97 $xy = k$ represent family of

(a) rectangular hyperbola (b) family of straight line (c) None

98 $\frac{x}{xyz^2} = \frac{1}{k}$ represent family of

(a) ellipse (b) Hyperbola (c) circle (d) None

99 $4x^2 + y^2 + 9z^2 = 1$ represents family of

(a) ellipsoide (b) Planes (c) cones (d) None

100 D.D. of $r = x - y$ $P(4,5)$ $\vec{a} = 2i + j$ is

(a) $\frac{-2}{\sqrt{5}}$ (b) $\frac{1}{\sqrt{5}}$ (c) $\frac{2}{\sqrt{5}}$ (d) None

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Answer Sheet

1 Ans (a) 2 (a) 3 (b) 4 (c) 5 (c)

6) (a) 7 (c) (8) (b) 9 (a) 10 (b)

11 (a) 12 (b) 13 (c) 14 (b) 15 (c) 16 (b)

17 (b) 18 (a) 19 (c) 20 (c) 21 (b) 22 (a)

23 (a) 24 (b) 25 (c) 26 (a) 27 (a) 28 (c)

29 (c) 30 (b) 31 (a) 32 (b) 33 (c) 34 (c)

35 (b) 36 (b) 37 (c) 38 (a) 39 (a) 40 (b)

41 (c) 42 (c) 43 (b) 44 (b) 45 (b) 46 (c)

47 (a) 48 (a) 49 (b) 50 (c) 51 (c) 52 (a)

53 (a) 54 (c) 55 (a) 56 (b) 57 (b) 58 (a)

59 (b) 60 (c) 61 (c) 62 (b) 63 (b) 64 (d)

65 (a) 66 (c) 67 (b) 68 (b) 69 (c) 70 (b)

71 (a) 72 (c) 73 (a) 74 (c) 75 (a) 76 (a)

77 (b) 78 (c) 79 (c) 80 (a) 81 (c) 82 (b)

82 (b) (84) a 85 (b) 86 (c) 87 (a) 88 (b)

89 (c) 90 (a) 91 (a) 92 (b) 93 (a) 94 (b)

95 (a) 96 (b) 97 (a) 98 (c) 99 (a) 100 (b)