

2020-21 Onwards (MR-20)	MALLA REDDY ENGINEERING COLLEGE (Autonomous)	B.Tech. I Semester		
Code: A0B01	Linear Algebra and Numerical Methods I B. Tech I Sem I Mid Subjective Question Bank (Common For CSE, CSE (IOT,AI&ML,DS,CS& IT)	L	T	P
Credits: 4		3	1	-

Name of the faculty: M. Venkata Ramana Reddy

Q.No	Questions	Bloom's Taxonomy Level	CO
<u>Module-I</u>			
1.	Find the non-singular matrices P and Q such that PAQ is in normal form PAQ where $A = \begin{bmatrix} 1 & -1 & -1 \\ 1 & 1 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ Hence find its rank.	Applying	1
2.	Find the rank of the matrix $A = \begin{bmatrix} 2 & 3 & -1 & -1 \\ 1 & -1 & -2 & -3 \\ 3 & 1 & 3 & -2 \\ 6 & 3 & 0 & -7 \end{bmatrix}$ by reducing it to normal form	Analyzing	1
3.	Find the inverse of the matrix by Gauss Jordan method $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$.	Analyzing	1
4.	Discuss for what values of a and b the simultaneous equations $x+y+z=6$, $x+2y+3z=10$, $x+2y+az=b$ have (i) No solution (ii) a unique solution (iii) an infinite number of solutions.	Applying	1
5.	Solve the system of equations $x+y-2z+3w=0$, $x-2y+z-w=0$, $4x+y-5z+8w=0$, $5x-7y+2z-w=0$	Applying	1
6.	Solve the system $x+y-z=2$, $2x+3y+5z=-3$, $3x+2y-3z=6$ by using LU- Decomposition Method	Evaluating	1
<u>Module-II</u>			
1.	Determine the Eigen values and Eigen vectors of $A = \begin{bmatrix} 6 & -2 & 2 \\ -2 & 3 & -1 \\ 2 & -1 & 3 \end{bmatrix}$.	Evaluating	2
2.	Diagonalize the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 1 \\ -4 & 4 & 3 \end{bmatrix}$	Applying	2

3.	Reduce the quadratic form $2x^2-2xy-2xz+2y^2-2yz+2z^2$ to canonical form by an Orthogonal Transformation and hence find rank, index, signature and the nature of the quadratic form.	Applying	2
4.	Verify Cayley- Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$ Find the value of matrix $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$. Find A^{-1}	Understanding	2
5.	The Eigen values of a Skew-Hermitian matrix are purely imaginary or not.	Understanding	2
6.	If λ is the Eigen value of non-singular matrix A, then prove that $\frac{ A }{\lambda}$ is an Eigen value of Adj A	Understanding	2
<u>Module-III</u>			
1.	Apply Bisection method find the root of the equation $x \log_{10} x = 1.2$ that lies between 2 and 3 Carry out five steps of approximations.	Applying	3
2.	Solve the equation $x^3 + x^2 + x + 7 = 0$ correct 4 decimal places Using Regula - Falsi method	Applying	3
3.	Discover the Newton–Raphson’s formula for the $\sqrt[k]{N}$ is $x_{n+1} = \frac{1}{k} [(k-1) x_n + \frac{N}{x_n^{k-1}}]$ Hence deduce the value of $\sqrt[3]{24}$	Analyzing	3

Signature of the faculty

Signature of HOD

MALLA REDDY ENGINEERING COLLEGE (Autonomous)

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I B.Tech.I SEMESTER MID - I Objective Questions Common For CSE, CSE (IOT,AI&ML,DS,CS& IT

MR-20 REGULATIONS

Sub: LA&NM

- 1) Rank of $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is []
A)3 B)0 C)2 D)None
- 2) If A is a matrix of order $m \times n$ then $\rho[A] \leq$ []
A) $\min(m,n)$ B) $\max(m,n)$ C) equal to m D) None
- 3) Rank of $\begin{bmatrix} 3 & 4 & 5 \\ 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$ is []
A)1 B) 2 C) 3 D) None
- 4) The necessary and sufficient condition that the system of equations $AX = B$ is consistent is []
A) $\rho[AB] = \rho[A]$ B) $\rho[AB] \neq \rho[A]$ C) $\rho[AB] < \rho[A]$ D) None
- 5) The system of equations $AX = B$ has no solution if []
A) $\rho[AB] = \rho[A]$ B) $\rho[AB] \neq \rho[A]$ C) $\rho[AB] < \rho[A]$ D) None
- 6) If n is the number of unknowns, r is rank of A , for the system $AX = B$ has a unique solution if []
A) $\rho[AB] = \rho[A] = r = n$ B) $\rho[AB] \neq \rho[A]$ C) $\rho[AB] = \rho[A] = r < n$ D) None
- 7) If n is the number of unknowns, " r " is rank of A , for the system $AX = B$ has a infinite number of solution if []
A) $\rho[AB] = \rho[A] = r = n$ B) $\rho[AB] \neq \rho[A] = r > n$ C) $\rho[AB] = \rho[A] = r < n$ D) None
- 8) The rank of the matrix $A = \begin{bmatrix} 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 \\ 3 & 3 & 3 & 3 \end{bmatrix}$ is []
A)4 B)3 C)2 D)1
- 9) If A is hermitian matrix then iA is _____ []
A) Hermitian B) Skew hermitian C) Unitary D) Idempotent
- 10) The system of equations $x+y+z=2; 2x+2y+2z=4; 3x+3y+3z=6$ has []
A) no solution B) infinite solutions C) unique solution D) None
- 11) The value of x and y if $\begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} 5 \\ 4 \end{bmatrix}$ []
A) $x=4, y=5$ B) $x=4, y=-3$ C) $x=1, y=2$ D) $x=4, y=-5$
- 12) Transpose of unitary matrix is----- []

A) Unitary B) hermitian C) idempotent D) nilpotent

13) If A is a matrix of order 4x5 and the rank of A is 2, the normal form reduced matrix of A is []

A) $\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ B) $\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ C) $\begin{bmatrix} 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$ D) None

14) The determinant of an orthogonal matrix is []

A) ± 1 B) < 1 C) 0 D) None

15) The rank of the matrix $\begin{bmatrix} k & -1 & 0 \\ 0 & k & -1 \\ -1 & 0 & k \end{bmatrix}$ is 2 for k = []

A) 0 B) 2 C) 1 D) None

16) The system of equations $x+2y=5$, $-2x+ay=4$ are consistent if _____ []

A) $a=-4$ B) $a=4$ C) $a \neq -4$ D) none

17) If A and B are matrices and if AB is defined then the rank of AB is equals to _____ []

A) rank of A B) rank of B C) $\leq \min\{\text{rank of A, rank of B}\}$ D) None

18) If A is orthogonal matrix then A^{-1} equals to _____ []

A) A B) A^T C) A^2 D) None

19) Which of the following is Skew symmetric matrix _____ []

A) $\begin{bmatrix} 2 & 1 & -2 \\ -1 & 2 & -1 \\ 1 & 0 & 5 \end{bmatrix}$ B) $\begin{bmatrix} 2 & -1 & -2 \\ -1 & 2 & 1 \\ 1 & 0 & 5 \end{bmatrix}$ C) $\begin{bmatrix} 2 & 1 & -2 \\ -1 & 2 & 1 \\ -1 & 0 & -5 \end{bmatrix}$ D) $\begin{bmatrix} 0 & -3 & -2 \\ 3 & 0 & -4 \\ 2 & 4 & 0 \end{bmatrix}$

20) Which of the following is Symmetric matrix is _____ []

A) $\begin{bmatrix} 2 & 1 & -2 \\ -1 & 2 & -1 \\ 1 & 0 & 5 \end{bmatrix}$ B) $\begin{bmatrix} 2 & -1 & -2 \\ -1 & 2 & 1 \\ 1 & 0 & 5 \end{bmatrix}$ C) $\begin{bmatrix} 2 & 1 & -2 \\ -1 & 2 & 1 \\ -1 & 0 & -5 \end{bmatrix}$ D) $\begin{bmatrix} 2 & -1 & -2 \\ -1 & 2 & 1 \\ -2 & 1 & -5 \end{bmatrix}$

21) The rank of a unit matrix of order 'n' is _____ []

A) $n+2$ B) $n-1$ C) n D) $n+1$

22) The rank of the matrix A= is _____ []

A) 1 B) 0 C) n D) $n+1$

23) Which of the following is true []

A) The determinant of orthogonal matrix is ± 1 B) The product of two unitary matrices is unitary
C) If A is symmetric then $BTAB$ is also symmetric D) All are true

24) The rank of a singular matrix of order n is _____ []

A) $\leq n-1$ B) n C) $n-2$ D) $\leq n$

- 25) The rank of a non-singular matrix of order n is _____ []
 A) 1 B) 0 C) n D) $n+1$
- 26) Which of the following is true []
 A) If A is symmetric matrix then A^2 is also symmetric matrix
 B) The product of two orthogonal matrices is orthogonal
 C) The Rank of the matrix of order 1×230443 is 1
 D) All are true
- 27) The values of 'k' for which the equations $x+y+z=1, 4x+y+10z=k^2, 2x+y+4z=k$ have a solution is _____ []
 A) 1 B) -2 C) 3 D) 6
- 28) If A be $n \times n$ matrix of rank ' n ', then rank of $\text{Adj } A$ is _____ []
 A) 1 B) 0 C) n D) $n+1$
- 29) The rank of a matrix every element of which is unity is _____ []
 A) 1 B) 2 C) 3 D) 6
- 30) If a square A can be expressed as a sum of Symmetric matrix p and skew symmetric matrix Q then P and Q are []
 A) Singular B) Non-Singular C) Null D) None
- 31) If the rank of matrix $A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 4 & 5 & 6 \\ 3 & 4 & 5 & 6 & 7 \\ 4 & 5 & 6 & 7 & 8 \\ 5 & 6 & 7 & 8 & 9 \end{bmatrix}$ is 2 then the value of x is _____ []
 A) 1 B) 2 C) 3 D) 6
- 32) For the system $AX = B, \rho[A/B] \neq \rho[A]$ then the system has _____ solution []
 A) No B) Unique C) Infinite D) Trivial
- 33) For $\begin{bmatrix} 1 & 2 & 3 & \vdots & 6 \\ 0 & 1 & 2 & \vdots & 3 \\ 0 & 0 & a-8 & \vdots & b-15 \end{bmatrix}$ if $b \neq 15, a \neq 8$, the system has _____ solution. []
 A) No B) Unique C) Infinite D) Trivial
- 34) If $[A/B] = \begin{bmatrix} 1 & 2 & 3 & \vdots & 6 \\ 0 & 1 & 2 & \vdots & 3 \\ 0 & 0 & a-8 & \vdots & b-15 \end{bmatrix}$ and if $a = 8, b = 15, \rho[A/B] =$ []
 A) 1 B) 2 C) 3 D) 6
- 35) If $[A/B] = \begin{bmatrix} 1 & 2 & 3 & \vdots & 6 \\ 0 & 1 & 2 & \vdots & 3 \\ 0 & 0 & a-8 & \vdots & b-15 \end{bmatrix}$ and if $a = 8, b \neq 15, \rho[A/B] =$ _____ []
 A) 1 B) 2 C) 3 D) 6
- 36) If there are 4 non homogeneous equations in 6 unknowns then the system has []
 A) No Solution B) Unique Solution C) Infinite Solution D) none
- 37) The rank of $A = \begin{bmatrix} 0 & 1 & -1 \\ 2 & 0 & 4 \\ 3 & -2 & 0 \end{bmatrix}$ is _____ []
 A) 1 B) 2 C) 3 D) 6

- 38) For the system $AX = O, \rho[A] = n$ (no. of unknowns) then the system has _____ solution []
 A) No Solution B) Non-trivial C) Trivial D) None
- 39) The determinant of a $A_{3 \times 3}$ is zero and determinant of at least one sub-matrix of order 2 is not equal to zero then the rank of A is _____ []
 A) 1 B) 2 C) 3 D) 6
- 40) $\begin{vmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{vmatrix} =$ _____ []
 A) 1 B) 2 C) 3 D) 6
- 41) For the system $AX = O, \rho[A] < n$ (no. of unknowns) then the system has _____ solution []
 A) No Solution B) Non-trivial Solution C) Trivial Solution D) None
- 42) If A is any square matrix is said to be Symmetric matrix then []
 A) $A' = A$ B) $A' = -A$ C) $AA^T = A^T A = I$ D) $A^m = 0$
- 43) If A is any square matrix is said to be Skew-Symmetric matrix then []
 A) $A' = A$ B) $A' = -A$ C) $AA^T = A^T A = I$ D) $A^m = 0$
- 44) If A is any square matrix is said to be Orthogonal matrix then []
 A) $A' = A$ B) $A' = -A$ C) $AA^T = A^T A = I$ D) $A^m = 0$
- 45) If A is any square matrix is said to be Nilpotent matrix then []
 A) $A' = A$ B) $A' = -A$ C) $AA^T = A^T A = I$ D) $A^m = 0$
- 46) If A is any square matrix is said to be Idempotent matrix then []
 A) $A^2 = I$ B) $A^2 = -A$ C) $A^2 = A$ D) $A^2 = -I$
- 47) If A is any square matrix is said to be Involutionary matrix then []
 A) $A^2 = I$ B) $A^2 = -A$ C) $A^2 = A$ D) $A^2 = -I$
- 48) Which of the following is orthogonal matrix []
 A) $\begin{bmatrix} -\frac{2}{3} & \frac{1}{3} & \frac{2}{3} \\ \frac{2}{3} & \frac{2}{3} & \frac{1}{3} \\ \frac{1}{3} & -\frac{2}{3} & -\frac{2}{3} \end{bmatrix}$ B) $\begin{bmatrix} -\frac{2}{3} & \frac{1}{3} & \frac{2}{3} \\ \frac{2}{3} & -\frac{2}{3} & \frac{1}{3} \\ \frac{1}{3} & -\frac{2}{3} & \frac{2}{3} \end{bmatrix}$ C) $\begin{bmatrix} -2/3 & 1/3 & 2/3 \\ 2/3 & 2/3 & 1/3 \\ -1/3 & -2/3 & -2/3 \end{bmatrix}$ D) $\begin{bmatrix} -2/3 & 1/3 & 2/3 \\ 2/3 & 2/3 & 1/3 \\ 1/3 & -2/3 & 2/3 \end{bmatrix}$
- 49) If A is Skew Hermitian matrix then iA is []
 A) Skew hermitian B) Unitary C) Hermitian D) orthogonal
- 50) Which of the following statement is false []
 A) Principal diagonal elements of Skew hermitian matrix are either zero or purely imaginary
 B) Principal diagonal elements of hermitian matrix are real
 C) Principal diagonal elements of Skew symmetric matrix are zero
 D) Principal diagonal elements of orthogonal matrix are 1

51) The Eigen values of the matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ are _____ []
 1,6 B)2,5 C)4,3 D)0,7

52) The Eigen values of the matrix $A = \begin{bmatrix} -1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 0 & -2 \end{bmatrix}$ are _____ []
 A)-1,3,-2 B)-1,2,3 C)1,-3,-2 D) -1,-3,-2

53) Sum of the Eigen values of the matrix $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ _____ []
 A)3 B)5 C)7 D)10

54) The Eigen values of a matrix $A = \begin{bmatrix} 2 & 1 \\ 2 & 3 \end{bmatrix}$ are _____ []
 A)2,4 B)1,4 C)1,-4 D) None

55) The Eigen values of A and A^T are _____ []
 A)Not same B) same C)0,0,1 D) None

56) The product of the Eigen values of a matrix A is equal to _____ []
 A)A B) Adj (A) C)DetA D) None

57) If λ is an eigen value of non singular matrix A then $|A| / \lambda$ is an Eigen value of _____ []
 A)AdjA B) A^{-1} C) A^T D)none

58) The Eigen values of a matrix $A = \frac{1}{2} \begin{bmatrix} i & \sqrt{3} \\ \sqrt{3} & i \end{bmatrix}$ are _____ []
 A) $\frac{i+\sqrt{3}}{2}, \frac{i-\sqrt{3}}{2}$ B) $\frac{i+\sqrt{2}}{2}, \frac{i-\sqrt{2}}{2}$ C) $\frac{i+1}{2}, \frac{i-1}{2}$ D)None

59) The Product of the Eigen values of the matrix $A = \begin{bmatrix} -1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 0 & -2 \end{bmatrix}$ is _____ []
 A)6 B)1 C)-6 D)None

60) The Eigen vectors corresponding to distinct Eigen values of a matrix are _____ []
 A)Linearly independent B)Linearly dependent C) cannot say D)none

61) If one of the Eigen values of A is Zero, then A is _____ []
 A)Singular B)non-singular C)symmetric D)non-symmetric

62) Write the symmetric matrix corresponding to the quadratic form $x^2+6xy+5y^2$ []
 A) $\begin{bmatrix} 5 & 3 \\ 3 & 1 \end{bmatrix}$ B) $\begin{bmatrix} 1 & 3 \\ 3 & 5 \end{bmatrix}$ C) $\begin{bmatrix} 1 & 6 \\ 6 & 5 \end{bmatrix}$ D)None

63) If all The Eigen values of A are Non-zeros then A is _____ []
 A)Singular B)non-singular C)symmetric D)non-symmetric

- 64) The Eigen vectors for distinct eigen values of a Symmetric matrix are []
 A)Non-zero B)Linearly Independent C)Linearly Dependent D)Orthogonal
- 65) The Eigen values of the matrix A are 1,2,3 then product of the Eigen values of matrix A^{-1} is []
 A) 6 B)1/6 C)-6 D)-1/6
- 66) The Eigen values of the matrix A are 1,2,3 then sum of the Eigen values of matrix A^{-1} is []
 A) 6/11 B)11/6 C)6 D)-1/6
- 67) If 2,3,4 are eigen values of A then the eigen values of $A-3I$ are []
 A) -1,0,1 B)-1,-1,0 C)1,1,0 D)1,1,1
- 68) Geometric multiplicity is defined as []
 A) Total no. of Eigen values
 B) Total no. of Eigen vectors
 C) Total no. of Linearly Independent eigenvectors
 D) Total no. of Linearly dependent vectors
- 69) The concept of Algebraic multiplicity will come at []
 A) Repeated Eigen value B) Repeated Eigen vector C) Distinct Eigen vector D)All
- 70) The sum of the Eigen values of the matrix $A = \begin{bmatrix} -1 & 2 & 3 \\ 0 & 3 & 5 \\ 0 & 0 & -2 \end{bmatrix}$ is _____ []
 A)6 B)1 C)-6 D)0
- 71) If the Matrix A is singular, then one of the Eigen value of A is _____ []
 A)0 B)1 C)2 D)3
- 72) If λ is the Eigen value of a non-singular matrix A. then the Eigen value of $\text{Adj}(A)$ is _____ []
 A) λ B) $\frac{|A|}{\lambda}$ C) $\frac{1}{\lambda}$ D)None
- 73) The characteristic roots of a real symmetric matrix are _____ []
 A)Imaginary B) Real C)complex D)None
- 74) The matrix p which diagonalize a given matrix A is called _____ []
 A)Singular matrix B) Spectral matrix C) Modal matrix D) None
- 75) The diagonal matrix D obtained by diagonalization is called _____ []
 A)Singular matrix B) Spectral matrix C) Modal matrix D) None
- 76) If the Eigen values of A are 1,2,3 then the Eigen values of A^3 are _____ []
 A)1,2,3 B)1,4,9 C)1,8,27 D) None
- 77) If λ is an Eigen value of A, then Eigen values of A^T is _____ []
 A) $1+\lambda$ B) λ C) $\frac{1}{\lambda}$ D) None

- 78) Nature of the quadratic form $x^2+4xy+6xz-y^2+2yz+4z^2$ is []
 A) Positive semi definite B) Indefinite C) Negative semi definite D) Negative definite
- 79) Symmetric matrix associated with the given quadratic form $4x^2-8xy+4xz+3y^2-6yz+z^2$ is []
 A) $\begin{bmatrix} 4 & 4 & 2 \\ 4 & 3 & -3 \\ 2 & -3 & 1 \end{bmatrix}$ B) $\begin{bmatrix} 4 & -4 & 2 \\ -4 & 3 & 3 \\ 2 & 3 & 1 \end{bmatrix}$ C) $\begin{bmatrix} 4 & -4 & 2 \\ -4 & 3 & -3 \\ 2 & -3 & 1 \end{bmatrix}$ D) $\begin{bmatrix} 4 & -4 & 2 \\ -4 & 3 & -3 \\ 2 & -3 & -1 \end{bmatrix}$
- 80) Eigen values of Idempotent matrix are []
 A) 0,-1 B) 0,1 C) 0,0 D) 1,1
- 81) The product of the Eigen values of $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ is _____ []
 A) 5 B) -25 C) 6 D) -36
- 82) The Eigen values of $A = \begin{bmatrix} a & h & g \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$ are _____ []
 A) a,b,c B) $1/a, 1/b, 1/c$ C) -a,-b,-c D) $-1/a, -1/b, -1/c$
- 83) If the Eigen values of A are 1,1,2 then the Eigen values of A^2 are _____ []
 A) 1,1,2 B) 1,1,4 C) 1,1,8 D) None
- 84) The sum of eigen values a matrix $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$ is _____ []
 A) DetA B) trace of the matrix A C) Both A&B D) None
- 85) The sum of eigen values a matrix $A =$ is _____ []
 A) 0 B) 1 C) 7 D) 5
- 86) The eigen values of an unitary matrix have absolute value []
 A) 2 B) -1 C) 1 D) -2
- 87) The eigen values of matrix are $\begin{bmatrix} 4 & 1-3i \\ 1+3i & 7 \end{bmatrix}$ []
 A) -2,9 B) 2,-9 C) -2,-9 D) 2,9
- 88) The eigen values of matrix are $\begin{bmatrix} 3i & 2+i \\ -2+i & -i \end{bmatrix}$ []
 A) $4i, -2i$ B) $-4i, -2i$ C) $4i, 2i$ D) $-4i, 2i$
- 89) Eigen values of nilpotent matrix of order 2 are []
 A) 0,-1 B) 0,0 C) 0,1 D) 1,1

- 90) If 2 is an eigen value of orthogonal matrix A of order 2 then another eigen value of A []
 A)-2 B)-1/2 C)1/2 D)0
- 91) If 1,3,-2 are the eigen value of A then eigen values of $3A^3+5A^2-6A+2I$ are []
 A)-4,110,10 B)4,-110,10 C)4,110,10 D)4,110,-10
- 92) The Product of the Eigen values of the matrix $A = \begin{bmatrix} -3 & 2 & 5 \\ 0 & 3 & 1 \\ 0 & 0 & -3 \end{bmatrix}$ is _____ []
 A)9 B)-9 C)27 D)-27
- 93) The Eigen values of a matrix $A = \begin{bmatrix} 1 & 0 \\ 0 & 3 \end{bmatrix}$ are _____ []
 A)0,1 B)0,3 C)1,3 D)1,9
- 94) If the Eigen values of A are 1,2,3 then the Eigen values of A^{-1} are _____ []
 A)1,2,3 B)1,1/2,1/3 C) Both A&B D) None
- 95) The eigen values of a real skew symmetric matrix are all []
 A)real B) zeros C) Either purely imaginary or zero D) none
- 96) The Eigen values of a matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & 1 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ are []
 A)1,1,1 B)0,0,1 C)0,0,2 D)0,0,3
- 97) The nature of the quadratic form $2x^2+2y^2+2z^2+2yz$ is []
 A)Positive definite B) Positive semidefinite C) negative definite D) negative semidefinite
- 98) If the eigen values of A are 0,0,5 then the rank of the quadratic form is []
 A)1 B)2 C)3 D)None
- 99) If the eigen values of A are -1,-2,-3 then the nature of the quadratic form is []
 A)Positive definite B) Positive semidefinite C) negative definite D) negative semidefinite
- 100) If the eigen values of A are 0,-2,-3 then the nature of the quadratic form is []
 A)Positive definite B) Positive semidefinite C) negative definite D) negative semidefinite
- 101) The value of C of Rolle's theorem for $f(x)=\frac{\sin x}{e^x}$ in (0,1) is _____ []
 a) π b) $\frac{\pi}{4}$ c) $\frac{\pi}{3}$ d) None
- 102) The value of C in Cauchy's mean value theorem for $f(x)=e^x$ and $g(x)=e^{-x}$ defined on [a,b], $0<a<b$ is _____ []
 a) $\sqrt{ab}$ b) $\frac{a-b}{2}$ c) $\frac{a+b}{2}$ d) None
- 103) If $f(x)$ is continuous in [a,b], $f^{-1}(x)$ exists for every value of x in (a,b), $f(a)=f(b)$, there exists at least one value c in (a,b) such that $f^{-1}(c)=$ _____ []

- a) 0 b) a+b c) c d) b

104) The value of Rolle's theorem in $(-1,1)$ for $f(x)=x^3 - x$ is _____ []

- a) 0 b) $\pm \frac{1}{\sqrt{3}}$ c) $\frac{1}{2}$ d) -1

105) The value of x so that $\frac{f(b)-f(a)}{b-a} = f'(x)$ when $a < x < b$ given $f(x) = x^2$, $a=1, b=4$ is _____ []
a) 1/2 b) 3/2 c) 5/2 d) None

106) The value of c of Cauchy's mean value theorem for the function $f(x) = x^2$, and $g(x) = x^3$ in $[1,2]$ _____ []
a) 3/14 b) 17/9 c) 14/9 d) 4/9

107) The value of c of Rolle's theorem in $[\frac{1}{2}, 2]$ for $f(x) = x^2 + \frac{1}{x^2}$ is _____ []
a) 3/4 b) 5/4 c) 1 d) 0

108) The value of c in Rolle's theorem for $f(x) = \sin x$ in $(0, \pi)$ is _____ []
a) 1/a b) $\frac{\pi}{4a}$ c) $\frac{\pi}{2a}$ d) None

109) The value of c in Rolle's theorem for $f(x) = x^2$ in $(-1,1)$ is _____ []
a) 0 b) 0.25 c) 0.5 d) 0.75

110) The value of c in Rolle's theorem for $f(x) = x^2 - x$ in $(0,1)$ _____ []
a) 0 b) 0.25 c) 0.5 d) 0.75

111) The value of c in Lagrange's mean value theorem for $f(x) = e^x$ in $(0,1)$ is _____ []
a) $\log e$ b) $\log(e+1)$ c) $\log(e-1)$ d) $\log(e+2)$

112) The value of c in Cauchy mean value theorem for $f(x) = e^x$ and $g(x) = e^{-x}$ in $(3,7)$ is []
a) 5 b) -5 c) 4.5 d) -4.5

113) The value of c in Cauchy's mean value theorem for $f(x) = \sqrt{x}$ and $g(x) = \frac{1}{\sqrt{x}}$ in $(1,4)$ is []
a) 1.5 b) 2 c) 2.5 d) -2

114) The value of c in Lagrange's mean value theorem for $f(x) = \log x$ in $[1,e]$ is []
a) $(e-1)^{-1}$ b) $e+1$ c) $e-1$ d) e

115) Lagrange's mean value theorem is not applicable to the function $f(x) = x^{\frac{1}{2}}$ in $[-1,1]$ because []
a) $f(-1) \neq f(1)$ b) f is not continuous in $[-1,1]$ c) f is not derivable in $[-1,1]$ d) None

116) Lagrange's Mean Value Theorem is not applicable to the function defined by $f(x) = x \sin^{\frac{1}{x}}(x) \neq 0$ and $f(0) = 0$ because _____ on $[-1,1]$ []
a) $f(-1) = f(1)$ b) f is not continuous in $[-1,1]$ c) f is not derivable in $(-1,1)$ d) None

117) The value of c for Lagrange's MVT for the function $f(x) = \cos x$ in $[0, \frac{\pi}{2}]$ is _____ []

- a) $\cos^{-1}\left(\frac{2}{\pi}\right)$ b) $\sin^{-1}\left(\frac{2}{\pi}\right)$ c) $\sin^{-1}\left(\frac{1}{\pi}\right)$ d) None
- 118) The value of c for Rolle's theorem for $f(x)=(x-a)(x-b)$ in $[a,b]$ is _____ []
a) $-\frac{a+b}{2}$ b) $\frac{a+b}{2}$ c) $a+b$ d) $a-b$
- 119) The value of c of Lagrange's mean value theorem for $f(x)=(x-2)(x-3)$ in $[0,4]$ []
a) 2 b) 1 c) 0.5 d) 1.5
- 120) The value of c of Rolle's theorem for $f(x)=(x-1)(x-2)$ in $[0,3]$ is _____ []
a) 1.5 b) 2.5 c) 3 d) 3.5
- 121) The value of c of Cauchy's mean value theorem for $f(x)=\sin x$ and $g(x)=\cos x$ [] in $\left[0, \frac{\pi}{2}\right]$
a) $\frac{\pi}{8}$ b) $\frac{\pi}{6}$ c) $\frac{\pi}{4}$ d) None
- 122) Cauchy's theorem is converted to Lagrange's theorem by taking $g(x)=$ _____ []
a) $1/x$ b) x c) $-x$ d) $-1/x$
- 123) The value of c of the Rolle's theorem for $f(x)=\sin x$ in $[0, \pi]$ is ----- []
a) $\frac{\pi}{2}$ b) $-\frac{\pi}{2}$ c) π d) $-\pi$
- 124) The value of c of the Rolle's Theorem for $f(x)=x^3/3 - 3x$ in $[0,3]$ is----- []
a) $\sqrt{3}$ b) $-\sqrt{3}$ c) 2 d) -3
- 125) The value of c of Lagrange's Mean value theorem for $f(x)=x^2-3x+2$ in $[-2,3]$ []
a) $1/2$ b) 1 c) $3/2$ d) $-3/2$

Signature of the faculty

Signature of HOD