## **SRM Institute of Science and Technology**

## College of Engineering and Technology Department of Mathematics 21MAB101T- CALCULUS AND LINEAR ALGEBRA

Academic Year - 2023-2024		
Unit-1: Matrices		
1	Characteristic equation, Eigen values and Eigen vectors.	
2	Eigen values and Eigen vectors-problems.	
3	Properties of Eigen values-problems.	
4	Problem-solving using tutorial sheet 1	
5	Cayley - Hamilton theorem - Verification.	
6	Finding $A^{-1}$ and finding higher powers of A using Cayley – Hamilton theorem.	
7	Orthogonal matrices - Properties of Orthogonal matrices.	
8	Problem-solving using tutorial sheet 2	
9	Orthogonal reduction of a symmetric matrix to a diagonal form.	
10	Reduction of Quadratic form to Canonical form by orthogonal transformation.	
11	Discuss the nature of the Quadratic Form to Canonical form without reduction.	
12	Problem-solving using tutorial sheet 3	
Unit-2: Functions of several variables		
13	Functions of two variables – Total differential.	
14	Partial derivatives.	
15	Taylor's series expansion with two variables up to third-order terms.	
16	Problem-solving using tutorial sheet 4	
17	Maxima and Minima.	
18	Maxima and Minima- Problems.	
19	Constrained Maxima and Minima by Lagrangian Multiplier Method.	
20	Problem-solving using tutorial sheet 5	
21	Constrained Maxima and Minima by Lagrangian Multiplier Method – Problems.	
22	Jacobians - Problems	
23	Properties of Jacobians – Problems.	
24	Problem-solving using tutorial sheet 6	
Unit-3: Ordinary differential equations		
25	Linear equations of second order with constant coefficients -Type-1- PI= eax Type-2- PI=sin ax or cos ax.	
26	Type-3 -x <sup>n</sup> (polynomial), Type-4-PI= -x <sup>n</sup> $f(x)$ , $(f(x)=\sin ax \text{ or } \cos ax \text{ or } x^n)$	
27	Type-5- PI=x sin ax or x cos ax.	
28	Problem-solving using tutorial sheet 7	
20	Linear equations of second order with variable coefficients-Homogeneous equation of Euler	
29	type.  Homogeneous equation of Euler type – Problems.	
30	Homogeneous equation of Legendre's Type – Problems.	
31		
32	Problem-solving using tutorial sheet 8	
33	Method of Variation of parameters.	

Simultaneous first-order differential equations with constant coefficients.  Problem-solving using tutorial sheet 9  Unit-4: Differential Calculus and Beta Gamma functions  Radius of Curvature — Cartesian coordinates.  Radius of Curvature — Polar coordinates.  Problem - solving using tutorial sheet 10  Circle of curvature.  Problem - solving using tutorial sheet 10  Circle of standard curves — Problems.  Evolute of standard curves continuation.  Problem- solving using tutorial sheet 11  Envelope of standard curves.  Beta Gamma Functions - Definitions.  Problem - solving using tutorial sheet 12  Unit-5: Sequences and series  Sequences — Definition and Examples.  Series — Types of Convergence.  Test of Convergence - Comparison test.  Problem - solving using tutorial sheet 13  Test of Convergence - D'Alembert's Ratio test.  Raabe's root test — Problems.  Test of Convergence - Cauchy's Root test.  Problem - solving using tutorial sheet 14  Alternating Series: Leibnitz test.  Alternating Series: Leibnitz test.  Alternating Series: Logarithmic Test.				
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Centre of curvature.  40 Problem - solving using tutorial sheet 10  41 Circle of curvature.  42 Evolute of standard curves – Problems.  43 Evolute of standard curves continuation.  44 Problem - solving using tutorial sheet 11  45 Envelope of standard curves.  46 Beta Gamma Functions - Definitions.  47 Beta Gamma Functions - simple problems.  48 Problem - solving using tutorial sheet 12  Unit-5: Sequences and series  49 Sequences – Definition and Examples.  50 Series – Types of Convergence.  51 Test of Convergence - Comparison test.  52 Problem - solving using tutorial sheet 13  53 Test of Convergence - D'Alembert's Ratio test.  54 Raabe's root test – Problems.  55 Test of Convergence - Cauchy's Root test.  56 Problem - solving using tutorial sheet 14  57 Alternating Series: Leibnitz test.  58 Alternating Series: Logarithmic Test.  59 Alternating Series: Absolute Convergence- Conditional Convergence.	38	Radius of Curvature – Polar coordinates		
40 Problem - solving using tutorial sheet 10 41 Circle of curvature. 42 Evolute of standard curves - Problems. 43 Evolute of standard curves continuation. 44 Problem- solving using tutorial sheet 11 45 Envelope of standard curves. 46 Beta Gamma Functions - Definitions. 47 Beta Gamma Functions - simple problems. 48 Problem - solving using tutorial sheet 12  Unit-5: Sequences and series 49 Sequences - Definition and Examples. 50 Series - Types of Convergence. 51 Test of Convergence- Comparison test. 52 Problem - solving using tutorial sheet 13 53 Test of Convergence - D'Alembert's Ratio test. 54 Raabe's root test - Problems. 55 Test of Convergence - Cauchy's Root test. 56 Problem - solving using tutorial sheet 14 57 Alternating Series: Leibnitz test. 58 Alternating Series: Logarithmic Test. 59 Alternating Series: Absolute Convergence- Conditional Convergence.	39	Centre of curvature.		
Evolute of standard curves – Problems.  Evolute of standard curves continuation.  Problem- solving using tutorial sheet 11  Envelope of standard curves.  Beta Gamma Functions - Definitions.  Problem - solving using tutorial sheet 12  Unit-5: Sequences and series  Sequences – Definition and Examples.  Series – Types of Convergence.  Test of Convergence - Comparison test.  Problem - solving using tutorial sheet 13  Test of Convergence - D'Alembert's Ratio test.  Raabe's root test – Problems.  Test of Convergence - Cauchy's Root test.  Problem - solving using tutorial sheet 14  Alternating Series: Leibnitz test.  Alternating Series: Leibnitz test.  Alternating Series: Absolute Convergence - Conditional Convergence.	40			
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Problem- solving using tutorial sheet 11 Envelope of standard curves. Beta Gamma Functions - Definitions. Problem - solving using tutorial sheet 12 Unit-5: Sequences and series Sequences - Definition and Examples. So Series - Types of Convergence. Test of Convergence- Comparison test. Problem - solving using tutorial sheet 13 Test of Convergence - D'Alembert's Ratio test. Raabe's root test - Problems. Test of Convergence - Cauchy's Root test. Problem - solving using tutorial sheet 14 Alternating Series: Leibnitz test. Alternating Series: Logarithmic Test. Alternating Series: Absolute Convergence- Conditional Convergence.	43	Evolute of standard curves continuation		
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47 Beta Gamma Functions - simple problems.  48 Problem - solving using tutorial sheet 12  Unit-5: Sequences and series  49 Sequences - Definition and Examples.  50 Series - Types of Convergence.  51 Test of Convergence- Comparison test.  52 Problem - solving using tutorial sheet 13  53 Test of Convergence - D'Alembert's Ratio test.  54 Raabe's root test - Problems.  55 Test of Convergence - Cauchy's Root test.  56 Problem - solving using tutorial sheet 14  57 Alternating Series: Leibnitz test.  58 Alternating Series: Logarithmic Test.  59 Alternating Series: Absolute Convergence- Conditional Convergence.	46	Beta Gamma Functions - Definitions		
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Test of Convergence - D'Alembert's Ratio test.  Raabe's root test - Problems.  Test of Convergence - Cauchy's Root test.  Problem - solving using tutorial sheet 14  Alternating Series: Leibnitz test.  Alternating Series: Logarithmic Test.  Alternating Series: Absolute Convergence- Conditional Convergence.	52	Problem - solving using tutorial sheet 13		
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57 Alternating Series: Leibnitz test. 58 Alternating Series: Logarithmic Test. 59 Alternating Series: Absolute Convergence- Conditional Convergence.	_ 56			
58 Alternating Series: Logarithmic Test. 59 Alternating Series: Absolute Convergence- Conditional Convergence.	57			
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N. P + Co-ordinator

V. Signature of 2003

the HOD