

Course Code	21MAB101T	Course Name	CALCULUS AND LINEAR ALGEBRA	Course Category	B	BASIC SCIENCES	L	T	P	C
							3	1	0	4

Pre-requisite Courses	Nil	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Mathematics	Data Book / Codes / Standards	Nil		

Course Learning Rationale (CLR):		The purpose of learning this course is to:		Program Outcomes (PO)											
CLR-1 :	Apply the concept of Matrices in problems of Science and Engineering			1	2	3	4	5	6	7	8	9	10	11	12
CLR-2 :	Utilize Taylor series, Maxima minima, composite function and Jacobian in solving various Engineering problems			Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning
CLR-3 :	Apply the concept of Differential Equations in problems of Science and Engineering														
CLR-4 :	Utilize the concepts of radius of curvature, evolute, envelope in problems of Science and Engineering														
CLR-5 :	Apply the Sequences and Series concepts in Science and Engineering														
Course Outcomes (CO):		At the end of this course, learners will be able to:		3	3	-	-	-	-	-	-	-	-	-	-
CO-1:	Apply the concepts of Matrices to find Eigenvalues and Eigen Vectors problems solving in Science and Engineering			3	3	-	-	-	-	-	-	-	-	-	-
CO-2:	Apply Maxima and Minima, Jacobian, and Taylor series to solve problems in Science and Engineering			3	3	-	-	-	-	-	-	-	-	-	-
CO-3:	Solve the different types Differential Equations in Science and Engineering applications			3	3	-	-	-	-	-	-	-	-	-	-
CO-4:	Identify Radius, Centre, envelope and Circle of curvature and apply them in Science and Engineering			3	3	-	-	-	-	-	-	-	-	-	-
CO-5:	Identify convergence and divergence of series using different tests in Engineering applications			3	3	-	-	-	-	-	-	-	-	-	-

<b>Unit-1 : Matrices</b>	<b>12 Hour</b>
Characteristic equation – Eigen values and eigen vectors of a real matrix – Properties of eigen values – Cayley – Hamilton theorem – Orthogonal reduction of a symmetric matrix to diagonal form – Orthogonal matrices – Reduction of quadratic form to canonical form by orthogonal transformations.	
<b>Unit-2 : Functions of Several variables</b>	<b>12 Hour</b>
Function of two variables-Partial derivatives - Total differential - Taylor's expansion with two variables up to second order terms -Maxima and Minima - Constrained Maxima and Minima by Lagrangian Multiplier - Jacobians of two Variables - Jacobians Problems - Properties of Jacobians and Problems	
<b>Unit-3: Ordinary Differential Equations</b>	<b>12 Hour</b>
Linear equations of second order with constant coefficients when $PI=0$ or exponential - Linear equations of second order with constant coefficients when $PI=\sin ax$ or $\cos ax$ - Linear equations of second order with constant coefficients when $PI=\text{polynomial}$ Linear equations of second order with constant coefficients when $PI=\text{exponential}$ with $\sin ax$ or $\cos ax$ - Linear equations of second order with constant coefficients when $PI= \text{exponential}$ with $\text{polynomial}$ - Linear equations of second order with constant coefficients when $PI=\text{polynomial}$ with $\sinh ax$ or $\cosh ax$ - Linear equations of second order variable coefficients - Linear equations of second order variable coefficients - Homogeneous equation of Euler type - Homogeneous equation of Legendre's Type - Homogeneous equation of Legendre's Type - Equations reducible to homogeneous form - Equations reducible to homogeneous form - Variation of parameters - Variation of parameters - Simultaneous first order with constant co-efficient. - Simultaneous first order with constant co-efficient. - Simultaneous first order with constant co-efficient.	
<b>Unit-4 : Differential Calculus and Beta Gamma Functions</b>	<b>12 Hour</b>
Radius of Curvature – Cartesian coordinates - Radius of Curvature – Polar coordinates - Circle of curvature - Centre of curvature -Evolute of a parabola - Evolute of an ellipse - Envelope of standard curves - Beta Gamma Functions - Beta Gamma Functions and Their Properties Sequences – Definition and Examples - Series – Types of Convergence - Series of Five terms – Test of Convergence- -Comparison test – Integral test	
<b>Unit-5: Sequence and Series</b>	<b>12 Hour</b>
Series of Five terms – Test of Convergence- Comparison test – Integral test- Comparison test – Integral test- Comparison test – Integral test- D'Alemberts Ratio test ,D'Alemberts Ratio test, Raabe's root test. - Convergent of Exponential Series - Cauchy's Root test - Log test Log test - Alternating Series: Leibnitz test - Series of positive and Negative terms. - Absolute Convergence - Conditional Convergence	

Learning Resources	1. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.			4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010			
	2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.			5. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002			
	3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008			6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008			
Learning Assessment							
	Bloom's Level of Thinking	Continuous Learning Assessment (CLA)				Summative Final Examination (40% weightage)	
		Formative CLA-1 Average of unit test (50%)		Life Long Learning CLA-2 – (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	-	20%	-	20%	-
Level 2	Understand	20%	-	20%	-	20%	-
Level 3	Apply	30%	-	30%	-	30%	-
Level 4	Analyze	30%	-	30%	-	30%	-
Level 5	Evaluate	-	-	-	-	-	-
Level 6	Create	-	-	-	-	-	-
	Total	100 %		100 %		100 %	
Course Designers							
Experts from Industry		Experts from Higher Technical Institutions			Internal Experts		
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