Course Code	21MAB101T	Course Name	CALCULUS AND LINEAR ALGEBRA	Course Category	BS	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:
CLR-1 :	Application of Matrices in problems of Science and Engineering
CLR-2 :	To apply the concept of Taylor series, Maxima minima, composite function and Jacobian in problems of science and Engineering
CLR-3 :	To Apply the concept of Differential Equations in problems of Science and Engineering
CLR-4 :	To apply the concepts of radius of curvature, evolute, envelope in problems of Science and Engineering
CLR-5 :	Application of Sequences and Series in all problems involving Science and Engineering
CLR-6 :	Identify how engineering problems to solve with effective models

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)															
		1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Engineering Knowledge	Problem Analysis	Design & Development	Analysis, Design, Research	Modern Tool Usage	Society & Culture	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO - 1	PSO - 2	PSO - 3
CLO-1 :	Apply the Knowledge of Matrices, Eigenvalues and Eigen Vectors Reduce to Quadratics form in problems involving Science and Engineering	2	85	80	H		H						H			H			
CLO-2 :	Gain familiarity in the knowledge of Maxima and Minima, Jacobian, and Taylor series and apply them tn the problems involving Science and Engineering	2	85	80	H			H											
CLO-3 :	Gain knowledge in solution of Differential Equations and Its applications in engineering problems	2	85	80		H							H			H			
CLO-4 :	To gain the knowledge of Radius, Centre, envelopre and Circle of of curvature and apply them in the problems involving Science and Engineering	2	85	80	H	H							H			H			
CLO-5 :	Gain the knowledge of convergence and divergence of series using different test and apply sequences and Series in the problems involving Science and Engineering	2	85	80		H	H						H			H			
CLO-6 :	Gain Create mathematical constructs for engineering problems and identify solutions to solve them	2	85	80	H		H						H			H			

Unit-1 : Matrices

Characteristic equation- Eigen values of a real matrix- Eigen vectors of a real matrix- Properties of Eigen values Cayley – Hamilton theorem-Finding A inverse using Cayley – Hamilton theorem - Finding higher powers of A - orthogonal reduction of a symmetric matrix to diagonal form -orthogonal reduction of a symmetric matrix to diagonal form-Hands on tutorial session using computer processes- Reduction of Quadratic form to canonical- Quadratic form to canonical form by orthogonal transformations- Orthogonal matrices- Reduction of quadratic

form to canonical form

Unit-2 : Functions of Several variables

Function of two variables – Partial derivatives- Total differential concepts - Taylor's expansion with two variables up to second order terms- Maxima and Minima- Constrained Maxima and Minima by Lagrangian Multiplier method - Jacobians of two Variables- Properties of Jacobians and Problems.

Unit-3 : Ordinary Differential Equations

Linear equations of second order with constant coefficients when PI=0 or exponential - Linear equations of second order with constant coefficients when PI=sinax or cos ax- Linear equations of second order with constant coefficients when PI= exponential with polynomial- Linear equations of second order with constant coefficients when PI=polynomial with sinhax or coshax- Linear equations of second order variable coefficients- Homogeneous equation of Euler type- Homogeneous equation of Legendre's Type- Equations reducible to homogeneous form- Variation of parameters- Simultaneous first order with constant co-efficient.

Unit-4 : Differential Calculus and Beta Gamma functions

Radius of Curvature – Cartesian coordinates-Radius of Curvature – Polar coordinates-Circle of curvature- 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

Unit-5 : Sequence and Series

Series of Five terms – Test of Convergence- Comparison test – Integral test- D'Alemberts Ratio test- Raabe's root test.- Covergent of Exponential Series- Cauchy's Root 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. 2. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010. 3. Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi,2008 4. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010 5. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson,Reprint, 2002 6. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008

Course Designers

(a) Experts from Industry

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(b) Experts from Higher Technical Institutions

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(c) Internal Experts

SLO – Session Learning Outcome

4	Dr.A.Govindarajan	SRMIST	govindaa@srmist.edu.in	5	Dr.N.Parvathi	SRMIST	parvathn@srmist.edu.in
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	Level of Thinking	*Continuous Assessment*			*Final Examination (40%)*
		CLAT– 1 (20%)	*CLAT – 2 (20%)*	*CLAT – 3 (20%) #*	
Level 1	*Remember* *Understand*	*40 %*	*30 %*	*30 %*	*30 %*
Level 2	*Apply* *Analyze*	*40 %*	*40 %*	*40 %*	*40 %*
Level 3	*Evaluate* *Create*	*20 %*	*30 %*	*30 %*	*30 %*

 # CLAT – 3 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

To emerge as a World - Class University in creating and disseminating knowledge, and providing students a unique learning experience in Science, Technology, Medicine, Management and other areas of scholarship that will best serve the world and betterment of mankind.

MOVE UP through international alliances and collaborative initiatives to achieve global excellence. ACCOMPLISH A PROCESS to advance knowledge in a rigorous academic and research environment. ATTRACT AND BUILD PEOPLE in a rewarding and inspiring environment by fostering freedom, empowerment, creativity and innovation.