Template 6 : Course Learning Syllabus

Course Learning Syllabus *(// includes Learning Outcomes & Learning Plan & Assessment Plan)*

Course Code	18MAB101T	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

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning: Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO): 1 Engineering Knowledge	2 Problem Analysis	3 Design & Development	4 Analysis, Design, Research	5 Modern Tool Usage	6 Society & Culture	7 Environment & Sustainability	8 Ethics	9 Individual & Team Work	10 Communication	11 Project Mgt. & Finance	12 Life Long Learning	13 PSO - 1	14 PSO - 2	15 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	L		L						M			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	L			M	M										
CLO-3:	Gain knowledge in solution of Differential Equations and Its applications in engineering problems	2	85	80		M							M			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	L	M		M					M			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		M	L						M			H			

		Learning Unit / Module 1	Learning Unit / Module 2	Learning Unit / Module 3	Learning Unit / Module 4	Learning Unit / Module 5
Duration (hour)		12	12	12	12	12
S-1	SLO-1	Characteristic equation	Function of two variables - Partial derivatives	Linear equations of second order with constant coefficients when PI=0 or exponential	Radius of Curvature - Cartesian coordinates	Series of Five terms - Test of Convergence-
	SLO-2	Eigen values of a real matrix	Total differential	Linear equations of second order with constant coefficients when PI=sinax or cosax	Radius of Curvature - Cartesian coordinates	Comparison test - Integral test-
S-2	SLO-1	Eigen vectors of a real matrix	Total differential	Linear equations of second order with constant coefficients when PI=polynomial	Radius of Curvature - Polar coordinates	Comparison test - Integral test-
	SLO-2	Eigen vectors of a real matrix	Taylor's expansion with two variables up to second order terms	Linear equations of second order with constant coefficients when PI=exponential with sinax or Cosax	Radius of Curvature - Polar coordinates	Comparison test - Integral test-.
S-3	SLO-1	Properties of Eigen values	Taylor's expansion with two variables up to third order terms	Linear equations of second order with constant coefficients when PI= exponential with polynomial	Circle of curvature	D'Alemberts Ratio test,
	SLO-2	Cayley - Hamilton theorem	Maxima and Minima	Linear equations of second order with constant coefficients when PI=polynomial with sinhax or coshax	Circle of curvature	D'Alemberts Ratio test,
S-4	SLO-1	Problem solving using tutorial sheet 1	Problem solving using tutorial sheet 4	Problem solving using tutorial sheet 6	Problem solving using tutorial sheet 11	Problem solving using tutorial sheet 14
	SLO-2	Problem solving using tutorial sheet 1	Problem solving using tutorial sheet 4	Problem solving using tutorial sheet 6	Applications of Radius of curvature in engineering	Problem solving using tutorial sheet 14
S-5	SLO-	Finding A inverse	Maxima and Minima	Linear equations of	Centre of curvature	Raabe's root test.

	1	using Cayley – Hamilton theorem		second order variable coefficients		
	SLO-2	Finging higher powers of A using Cayley – Hamilton theorem	Maxima and Minima	Linear equations of second order variable coefficients	Centre of curvature	Raabe's root test.
S-6	SLO-1	orthogonal reduction of a symmetric matrix to diagonal form	Maxima and Minima	Homogeneous equation of Euler type	Centre of curvature	Covergent of Exponential Series
	SLO-2	orthogonal reduction of a symmetric matrix to diagonal form	Constrained Maxima and Minima by Lagrangian Multiplier method	Homogeneous equation of Legendre's Type	Evolute of a parabola	Cauchy's Root test
S-7	SLO-1	orthogonal reduction of a symmetric matrix to diagonal form	Constrained Maxima and Minima by Lagrangian Multiplier method	Homogeneous equation of Legendre's Type	Evolute of an ellipse	Log test
	SLO-2	orthogonal reduction of a symmetric matrix to diagonal form	Constrained Maxima and Minima by Lagrangian Multiplier method	Equations reducible to homogeneous form	Envelope of standard curves	Log test
S-8	SLO-1	Problem solving using tutorial sheet 2	Problem solving using tutorial sheet 5	Problem solving using tutorial sheet 9	Problem solving using tutorial sheet 12	Problem solving using tutorial sheet 15
	SLO-2	Problem solving using tutorial sheet 2	Problem solving using tutorial sheet 5	Problem solving using tutorial sheet 9	Applications of Curvature in engineering	Problem solving using tutorial sheet 15
S-9	SLO-1	Reduction of Quadratic form to canonical	Jacobians of two Variables	Equations reducible to homogeneous form	Beta Gamma Functions	Alternating Series: Leibnitz test
	SLO-2	Quadratic form to canonical form by orthogonal transformations	Jacobians of Three variables	Variation of parameters	Beta Gamma Functions and Their Properties	Alternating Series: Leibnitz test
S-10	SLO-1	Quadratic form to canonical form by orthogonal transformations	Jacobians problems	Variation of parameters	Sequences – Definition and Examples	Series of positive and Negative terms.
	SLO-2	Orthogonal matrices	Jacobians Problems	Simultaneous first order with constant co-efficient.	Series – Types of Convergence	Series of positive and Negative terms.
S-11	SLO-1	Reduction of quadratic form to	Properties of Jacobians and	Simultaneous first order with constant	Series of Five terms – Test of	Absolute Convergence

		canonical form	Problems	co-efficient.	Convergence-	
	SLO-2	Reduction of quadratic form to canonical form	Properties of Jacobians and problems	Simultaneous first order with constant co-efficient.	Comparison test – Integral test-	Conditional Convergence
S-12	SLO-1	Problem solving using tutorial sheet 3	Application of Taylor's series Maxima Minima Jacobians in Engineering	Problem solving using tutorial sheet 10	Problem solving using tutorial sheet 13	Problem solving using tutorial sheet 13
	SLO-2	Applications of Matrices in Engineering	Application of Taylor's series Maxima Minima Jacobians in Engineering	Applications of Differential Equation in engineering	Problem solving using tutorial sheet 13	Applications Convergence of series in engineering

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

	Level of Thinking	Continuous Assessment			Final Examination (40%)
		CA – 1 (20%)	CA – 2 (20%)	CA – 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 %

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

SLO – Session Learning Outcome

Course Designers							
(a) Experts from Industry							
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(b) Experts from Higher Technical Institutions							
3	Dr.K.C.Sivakumar	IIT, Madras	kcskumar@iitm.ac.in	4	Dr.Nanjundan	Bangalore University	nanzundan@gmail.com
(b) Internal Experts							
5	Dr.A.Govindarajan	SRMIST	givindarajan.a@ktr.srmuniv.ac.in	6	Dr.Srinivasan	SRMIST	srinivasan.va@srmuniv.ac.in

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.