

Syllabus Template (First year of 25-26 entry Batch and second year of 24-25 entry Batch)

Course Code :		1BMA5101C	CALCULUS AND LINEAR ALGEBRA FOR CSE STREAM	Semester :	I
L:T:P :		3 : 1 : 0		Course Type :	BSC
Hours/Sem.	Teaching :	42+28Hrs		CIE Marks :	50
	Learning (TW+SL) :	44Hrs		SEE Marks :	50
	Exam :	6Hrs		Total Marks :	100
	Total Hrs. :	120Hrs		Credits :	04

Professional Competency:

Apply calculus and linear algebra to solve complex engineering problems.

Course Outcomes

After the completion of the course student will be able to

CO1: Apply the concepts of multivariable calculus to compute derivatives, optimize functions

CO2: Apply the concepts of vector calculus to vector fields for applications in computer science engineering.

CO3: Solve system of linear equations and determine eigen values and eigenvectors using direct and methods.

CO4: Apply the concepts of vector spaces and linear transformations to problems in computer science engineering.

UNIT-I

11 Hrs.

Multivariable Calculus

Statement of Taylor's and Maclaurin's series expansion for one variable. Partial differentiation, total derivative, differentiation of composite functions, Jacobian , Maxima and minima for the function of two variables.

UNIT-II

10Hrs.

Vector Calculus

Vector Differentiation: Scalar and vector fields, Gradient, directional derivatives, divergence and curl-physical interpretation, solenoidal vector fields, irrotational vector fields and scalar potential.

Vector Integration: Line integral, Green's theorem(Problem without verification).

UNIT-III

11 Hrs.

System of Linear Equations, Eigen values and Eigen vectors

Elementary row transformation of a matrix, echelon form, rank of a matrix. Consistency and solution of system of linear equations: Gauss elimination method, Gauss Jordan method. Applications: Traffic flow. Eigen values and Eigen vectors, model matrix.

UNIT-IV

10 Hrs.

Vector Space

Review Vector- spaces, subspace definition and examples. Linear Combinations, linear span, linearly independent and dependent sets, basis and dimension, Coordinates vector, inner products and orthogonality.

Linear Transformation

Definition and examples, algebra of linear transformations, matrix of a linear transformation. Singular, nonsingular linear transformations. Rank and nullity of linear transformations, Rank-Nullity theorem.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEd.,2021.
2. Gilbert Strang, Linear Algebra and its Applications, Cengage Publications,4th Ed.,2022.
3. Seymour Lipschutz and Marc Lipson, Linear Algebra, Schaum's outlines series,4thEd.,2008.

Reference Books

1. V.Ramana, Higher Engineering Mathematics” McGraw-Hill Education, 11th Ed., 2017
2. N.P Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 10th Ed., 2022.
3. James Stewart, Calculus, Cengage Publications, 7th Ed., 2019.
4. David Poole, Linear Algebra, a modern introduction, Cengage publishers, 4th Ed., 2014.
5. David Clay, Linear Algebra and its Applications, Pearson Publishers, 4th Ed., 2018.
6. Gareth Williams, Linear Algebra with applications, Jones Bartlett Publisher sInc., 6th Ed., 2017.

Web Links and Video Lectures:

<https://drive.google.com/file/d/1KtCtZmnJnOvV1S68wXS9FZPXUFvRktBQ/view?usp=sharing>

Table: Matrix to describe the mapping of COs with POs (considering WKs) and PSOs

Course Outcomes (COs)	Program Outcomes and (WKs)											Program Specific Outcomes (PSOs)	
	1	2	3	4	5	6	7	8	9	10	11	1	2
CO1	3 (WK1, W2, WK3, and WK4)	2 (WK1, W2 and WK3)						1			1		
CO2	3 (WK1, WK2, WK3, and WK4)	2 (WK1, W2 and WK3)						1			1		
CO3	3 (WK1, WK2, WK3, and WK4)	2 (WK1, W2 and WK3)						1			1		
CO4	3 (WK1, WK2, WK3, and WK4)	2 (WK1, W2 and WK3)						1			1		

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Scheme (from 2025-26)

Sl. N o.	Cour se Code	Course Title	Teaching-Learning Scheme				Examina tion Duration (Hrs/Sem .)		Tot al Hou rs	Examination Scheme and Evaluation			Cre dits (C)= Tot al Hou rs /30
			L Hrs/ Week (Hrs/ Sem.)	T Hrs/ Week (Hrs/Se m.)	P Hrs/ Week (Hrs/Se m.)	Term Work (TW) and Self Learni ng (SL) (TW+S L) Hrs/ Sem	CIE	SEE		CIE Mar ks	SEE Mar ks	Tota l Mar ks	
1	1BM AS10 1C	Calculus and linear algebra for CSE stream	3(42)	28	0	44	3	3	120	50	50	100	4= 120 /30