

## Department of Freshman Engineering

## Calculus and Linear Algebra

<b>Course Code</b>	20BS1101	<b>Year</b>	I	<b>Semester</b>	I
<b>Course Category</b>	Basic Science	<b>Branch</b>	ECE	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	Nil
<b>Continuous Internal Evaluation</b>	30	<b>Semester End Evaluation</b>	70	<b>Total Marks</b>	100

**Course Outcomes**

Upon successful completion of the course, the student will be able to

CO1	<b>Understand</b> the basic concepts of calculus and linear algebra.(L2)
CO2	<b>Apply</b> the echelon form to obtain the solution of system of linear equations and eigen vectors of a matrix.(L3)
CO3	<b>Apply</b> the concepts of calculus to find the series expansion and extremum of a given function ,area enclosed by plane curves and volume of the solids. (L3)
CO4	<b>Analyse</b> the solution set of linear system of equations and nature of the quadratic forms. (L4)
CO5	<b>Analyse</b> the behaviour of functions using mean value theorems, extremum of the given function and limits of integration. (L4)
CO6	<b>Apply</b> the concepts of calculus and linear algebra to the given problem and <b>submit a report</b>

**Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)**

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1													1	
CO2	3								2	2			1	
CO3	3								2	2			1	
CO4		3											1	
CO5		3											1	
CO6	3								2	2			1	

**Syllabus**

Unit No.	Syllabus	Mapped CO's
1	<b>Matrices-Linear System of Equations:</b> Rank of a matrix by Echelon form, Normal form, PAQ form, solving system of homogeneous and non-homogeneous linear equations.	CO1,CO2, CO4,CO6
2	<b>Eigen values and Eigen Vectors:</b> Eigen values, Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix, quadratic forms and nature of the quadratic forms.	CO1,CO2, CO4,CO6
3	<b>Mean Value Theorems:</b> Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proofs).	CO1,CO3, CO5,CO6
4	<b>Multivariable Calculus:</b> Functions of several variables, Jacobian, Functional dependence, maxima and minima of functions of two variables, method of Lagrange's multipliers.	CO1,CO3, CO5,CO6

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5	<p><b>Multiple Integrals:</b>  Double integrals, change of order of integration, double integration in polar coordinates,  Triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, volume as triple integral.  <b>Application-</b> Areas enclosed by plane curves.</p>	CO1,CO3, CO5,CO6
<b>Learning Resources</b>		
Text Books		
<ol style="list-style-type: none"> <li>1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44/e, 2019.</li> <li>2. Erwin Kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley &amp; Sons, 2006</li> </ol>		
Reference Books		
<ol style="list-style-type: none"> <li>1. N.P. Bali and Manish Goyal, A Text book of Engineering Mathematics, Laxmi Publications, 2008.</li> </ol>		
e- Resources & other digital material		
<ol style="list-style-type: none"> <li>1. <a href="https://nptel.ac.in/courses/111/108/111108157/">https://nptel.ac.in/courses/111/108/111108157/</a></li> <li>2. <a href="https://www.nptel.ac.in/courses/111/104/111104125/">https://www.nptel.ac.in/courses/111/104/111104125/</a></li> <li>3. <a href="https://youtu.be/xDSejIvZmg4">https://youtu.be/xDSejIvZmg4</a></li> <li>4. <a href="http://202.53.81.118/">http://202.53.81.118/</a> -&gt; PVPSIT FED-Moodle</li> </ol>		