



**BAPATLA ENGINEERING COLLEGE:: BAPATLA**  
(Autonomous)

<b>LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS</b>																
<b>I B.Tech I Semester 18MA001(CE)</b>																
Lectures	:	4 Periods/Week	Credits - 3	Continuous Assessment	:	50										
Final Exam	:	3 hours		Final Exam Marks	:	50										
<b>Pre-Requisite:</b> None																
<b>Course Objectives:</b> Students will learn how to																
➤	Solve a system of linear homogeneous and non-homogeneous equations, finding the inverse of a given square matrix and also its Eigen values and Eigen vectors															
➤	Identify the type of a given differential equation and select and apply the appropriate analytical technique for finding the solution of first order ordinary differential equations.															
➤	Create and analyze mathematical models using higher order differential equations to solve application problems that arise in engineering.															
➤	Solve a linear differential equation with constant coefficients with the given initial conditions using Laplace Transforms.															
<b>Course Outcomes:</b> After studying this course, the students will be able to																
CO-1	Find the eigen values and eigen vectors of a given matrix and its inverse.															
CO-2	Apply the appropriate analytical technique to find the solution of a first order ordinary differential equation.															
CO-3	Solve higher order linear differential equations with constant coefficients arise in engineering applications.															
CO-4	Apply Laplace transforms to solve differential equations arising in engineering.															
<b>Mapping of Course Outcomes with Program Outcomes &amp; Program Specific Outcomes</b>																
	<b>PO's</b>												<b>PSO's</b>			
<b>CO's</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
<b>CO-1</b>	3	3	2	-	-	-	-	-	-	-	-	2	2	-	-	-
<b>CO-2</b>	3	3	3	-	-	-	-	-	-	-	-	2	2	-	-	-
<b>CO-3</b>	3	3	3	-	-	-	-	-	-	-	-	2	2	-	-	-
<b>CO-4</b>	3	3	3	-	-	-	-	-	-	-	-	2	2	-	-	-
<b>UNIT-1</b>														(12 Hours)		
<p><b>Linear Algebra:</b> Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse; Consistency of linear System of equations: Rouches theorem, System of linear Non-homogeneous equations, System of linear homogeneous equations; vectors; Eigen values; properties of Eigen values(without proofs); Cayley-Hamilton theorem (without proof).</p> <p>[Sections: 2.7.1; 2.7.2; 2.7.6; 2.10.1; 2.10.2; 2.10.3; 2.12.1; 2.13.1; 2.14; 2.15.]</p>																



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<b>UNIT-2</b>	(12 Hours)
<p><b>Differential Equations of first order:</b> Definitions; Formation of a Differential equation; Solution of a Differential equation; Equations of the first order and first degree; variables separable; Linear Equations; Bernoulli's equation; Exact Differential equations; Equations reducible to Exact equations: I.F found by inspection, I.F of a Homogeneous equation, In the equation <math>M dx + N dy = 0</math>, <math>\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}</math> is a function of x and <math>\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}</math> is a function of y.</p> <p>Applications of a first order Differential equations: Newton's law of cooling; Rate of decay of Radio-active materials.</p> <p>[Sections: 11.1; 11.3; 11.4; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8]</p>	
<b>UNIT-3</b>	(12 Hours)
<p><b>Linear Differential Equations:</b> Definitions; Theorem; Operator D; Rules for finding the complementary function; Inverse operator; Rules for finding the Particular Integral; Working procedure to solve the equation; Method of Variation of Parameters; Applications of Linear Differential Equations: Oscillatory Electrical Circuits.</p> <p>[Sections: 13.1; 13.2.1; 13.3; 13.4; 13.5; 13.6; 13.7; 13.8.1; 14.1; 14.5].</p>	
<b>UNIT-4</b>	(12 Hours)
<p><b>Laplace Transforms:</b> Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by <math>t^n</math>; Division by t; Inverse transforms- Method of partial fractions; Other methods of finding inverse transforms; Convolution theorem(without proof); Application to differential equations: Solution of ODE with constant coefficients using Laplace transforms.</p> <p>[Sections: 21.2.1; 21.2.2; 21.3; 21.4; 21.7; 21.8; 21.9; 21.10; 21.12; 21.13; 21.14; 21.15.1]</p>	
<b>Text Books :</b>	B.S.Grewal, "Higher Engineering Mathematics", 44 <sup>th</sup> edition, Khanna publishers, 2017.
<b>References :</b>	<p>[1] Erwin Kreyszig, "Advanced Engineering Mathematics", 9<sup>th</sup> edition, John Wiley &amp; Sons.</p> <p>[2] N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.</p>