



BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS																
I B. Tech. I Semester																
(24 CE/CB/CM/CS/DS/EC/EE/IT/ME 101)																
Lectures	:	2 Hours/Week	Tutorial	:	1 Hour/Week	Practical	:	0								
CIE Marks	:	40	SEE Marks	:	60	Credits	:	3								
Pre-Requisite: None																
Course Objectives: 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.															
➤	Verify mean value theorems and expand functions of a single variable using Taylor's and Maclaurin's series.															
Course Outcomes: 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	Learn the applications of mean value theorems and Taylor's theorem.															
Mapping of Course Outcomes with Program Outcomes & Program Specific Outcomes																
	PO's												PSO's			
CO	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
CO-1	3	3	2	-	-	-	-	-	-	-	-	2	-	-	-	-
CO-2	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-	-
CO-3	3	3	3	-	-	-	-	-	-	-	-	2	-	-	-	-
CO-4	2	2	2	-	-	-	-	-	-	-	-	2	-	-	-	-
UNIT-1															(12 Hours)	
<p>Linear Algebra: Rank of a Matrix; Elementary transformations of a matrix; Gauss-Jordan method of finding the inverse; Normal form of a matrix, Consistency of linear System of equations: Rouche's 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). [Sections: 2.7.1; 2.7.2; 2.7.6; 2.7.7; 2.10.1; 2.10.2; 2.10.3; 2.12; 2.13; 2.14; 2.15.]</p>																



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UNIT-2	(12 Hours)
<p>Differential Equations of first order: 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 $M dx + N dy = 0$, $\frac{\frac{\partial M}{\partial y} - \frac{\partial N}{\partial x}}{N}$ is a function of x and $\frac{\frac{\partial N}{\partial x} - \frac{\partial M}{\partial y}}{M}$ 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; 11.4.1; 11.5; 11.6; 11.9; 11.10; 11.11; 11.12.1; 11.12.2; 11.12.4; 12.6; 12.8]</p>	
UNIT-3	(12 Hours)
<p>Linear Differential Equations: 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: Introduction, Oscillatory Electrical Circuits.</p> <p>[Sections: 13.1; 13.2; 13.3; 13.4; 13.5; 13.6; 13.7; 13.8.1; 14.1; 14.5].</p>	
UNIT-4	(12 Hours)
<p>Differential Calculus:</p> <p>Mean Value Theorems: Rolle's theorem, Lagrange's mean value theorem with their geometrical interpretation. Cauchy's mean value theorem. Taylor's and Maclaurin theorems with remainders (without proof), Maclaurin's series, Expansion by use of known series, Taylor's series.</p> <p>[4.3.1; 4.3.2; 4.3.3; 4.3.4; 4.4.1; 4.4.2; 4.4.3]</p>	
Text Books :	B.S.Grewal, "Higher Engineering Mathematics", 44 th edition, Khanna publishers, 2017.
References :	<p>[1] Erwin Kreyszig, "Advanced Engineering Mathematics", 9th edition, John Wiley & Sons.</p> <p>[2] N.P.Bali and M.Goyal, "A Text book of Engineering Mathematics" Laxmi Publications, 2010.</p>