



BAPATLA ENGINEERING COLLEGE:: BAPATLA
(Autonomous)

LINEAR ALGEBRA AND ORDINARY DIFFERENTIAL EQUATIONS															
I B.Tech. I Semester 20E1101/MA01															
Lectures	:	2 Hours/Week	Tutorial	:	1 Hour/Week	Practical	:	0							
CIE Marks	:	30	SEE Marks	:	70	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.														
➤	Solve a linear differential equation with constant coefficients with the given initial conditions using Laplace Transforms.														
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	Apply Laplace transforms to solve differential equations arising in engineering														
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
CO-1	3	3	2	-	-	-	-	-	-	-	-	2	-	2	-
CO-2	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
CO-3	3	3	3	-	-	-	-	-	-	-	-	2	-	2	-
CO-4	3	3	3	-	-	-	-	-	-	-	-	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; 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). [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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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; 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: 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>	
UNIT-4	(12 Hours)
<p>Laplace Transforms: Definition; conditions for the existence; Transforms of elementary functions; properties of Laplace Transforms; Transforms of derivatives; Transforms of integrals; Multiplication by t^n; 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>	
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>