

JAWAHARLAL NEHRUTECHNOLOGICALUNIVERSITY:KAKINADA

KAKINADA-533003, Andhra Pradesh, India

R-16 Syllabus for ME.JNTUK

I Year-I Semester		L	T	P	C
		4	0	0	3
	MATHEMATICS – I (R161102)				

Prerequisite Course: Knowledge and application of differentiation and integration

Course Description and Objectives:

- 1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
- 2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

CO	Course Outcomes	POs
1	Solve linear differential equations of first order.	5
2	Solve linear differential equations of second and higher order.	
3	Determine Laplace transform and inverse Laplace transform of various functions	3
4	Calculate total derivative, Jocobian and exreme values of functions of two	3
	variables.	
5	Solve partial differential equations of first order.	4
6	Solve partial differential equations of second and higher order.	4

Syllabus:

UNIT I:

Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact. Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

UNIT II:

Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax} , sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)- Method of Variation of parameters. Applications: LCR circuit, Simple Harmonic motion.

UNIT III:

Laplace transforms:

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals - Unit step function -Dirac's delta function- Inverse Laplace transforms- Convolution theorem (with out proof). Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

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UNIT IV:

Partial differentiation:

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables—Functional dependence- Jacobian. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT V:

First order Partial differential equations:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT VI:

Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type e^{ax+by} , $\sin(ax+by)$, $\cos(ax+by)$, $x^m y^n$. Classification of second order partial differential equations.

TEXT BOOKS:

- 1. B.S.Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
- 2. N.P.Bali, Engineering Mathematics, Lakshmi Publications.

REFERENCE BOOKS:

- 1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India
- 2. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn
- 3. Dean G. Duffy, Advanced engineering mathematics with MATLAB, CRC Press
- 4. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.
- 5. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
- 6. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.