JAWAHARLAL NEHRUTECHNOLOGICALUNIVERSITY:KAKINADA

KAKINADA–533003,AndhraPradesh,India

R-13 Syllabus for ME.JNTUK

I Year-I Semester		L	T	P	C
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MATHEMATICS – I (R13102)

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.	6
3	Determine Laplace transform and inverse Laplace transform of various functions	3
4	Calculate total derivative, Jocobian and exreme values of functions of two variables.	3
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.

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)
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 using Laplace transforms.

UNIT IV:

Partial differentiation:
Introduction- Total derivative-Chain rule- Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series for two variables– Functional dependence- Jacobian. Applications: Maxima and Minima of functions of two variables with constraints and without 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 type) equations.

UNIT VI:

Higher order Partial differential equations:
Solutions of Linear Partial differential equations with constant coefficients. Method of separation of Variables.
Applications: One- dimensional Wave, Heat equations - two-dimensional Laplace Equation.

TEXT BOOKS:
1. B.S.Grewal, Higher Engineering Mathematics, 42nd Edition, Khanna Publishers.
2. Erwin Kreyszig**,** Advanced Engineering Mathematics, 9th Edition, Wiley-India
3. Greenberg, Advanced Engineering Mathematics, 2nd edition, Pearson edn
4. Dean G. Duffy**,** Advanced engineering mathematics with MATLAB, CRC Press
5. Peter O'neil, Advanced Engineering Mathematics, Cengage Learning.

REFERENCE BOOKS:
1. N.P.Bali, Engineering Mathematics, Lakshmi Publications.
2. Srimanta Pal, Subodh C.Bhunia, Engineering Mathematics, Oxford University Press.
3. Dass H.K., Rajnish Verma. Er., Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.