

**MATHEMATICS – I (DIFFERENTIAL EQUATIONS)**  
(Common to All Branches)

**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.

Subject Category

ABET Learning Objectives a d e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**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

Subject Category

ABET Learning Objectives a d e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**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).

Application: Solutions of ordinary differential equations using Laplace transforms.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**UNIT IV Partial differentiation:**

Introduction- Total derivative-Chain rule-Generalized Mean Value theorem for single variable (without proof)-Taylors 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.

Subject Category

ABET Learning Objectives a c e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**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

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation A B E

**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.

Subject Category

ABET Learning Objectives a e

ABET internal assessments 1 2 6

JNTUK External Evaluation B E

**Books:**

1. **B.S.GREWAL**, Higher Engineering Mathematics, 42<sup>nd</sup> Edition, Khanna Publishers
2. **ERWIN KREYSZIG**, Advanced Engineering Mathematics, 9<sup>th</sup> Edition, Wiley-India
3. **GREENBERG**, Advanced Engineering Mathematics, 2<sup>nd</sup> edition, Pearson edn
4. **DEAN G. DUFFY**, Advanced engineering mathematics with MATLAB, CRC Press
5. **PETER O'NEIL**, advanced Engineering Mathematics, Cengage Learning.