

I Year – I SEMESTER

T	P	C
3+1	0	3

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, 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.

Subject Category	ABET Learning Objectives	ABET Internal Assessments	JNTUK External Evaluation	Remarks
Theory Design Analysis Algorithms Drawing Others	a) Apply knowledge of math, science, & engineering b) Design & conduct experiment, analyze & interpret data c) Design a system/process to meet desired needs within economic, social, political, ethical, health/safety, manufacturability, & sustainability constraints d) Function on multidisciplinary teams e) Identify, formulate, & solve engineering problems f) Understand professional & ethical responsibilities g) Communicate effectively h) Understand	1. Objective tests 2. Essay questions tests 3. Peer tutoring based 4. Simulation based 5. Design oriented 6. Problem based 7. Experiential (project based) based 8. Lab work or field work based 9. Presentation based 10. Case Studies based 11. Role-play based 12. Portfolio based	A. Questions should have: B. Definition, Principle of operation or philosophy of concept. C. Mathematical treatment, derivations, analysis, synthesis, numerical problems with inference. D. Design oriented problems E. Troubleshooting type of questions F. Applications related questions G. Brain storming questions	

	<p>impact of engineering solutions in global, economic, environmental, & societal context</p> <p>i) Recognize need for & be able to engage in lifelong learning</p> <p>j) Know contemporary issues</p> <p>k) Use techniques, skills, modern tools for engineering practices</p>			
--	---	--	--	--