

**I B. Tech. – I Semester
(17MA101) Mathematical Methods
(Common to all Branches)**

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

Pre-Requisites: None

Course Objectives:

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

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: Special functions:

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals Applications: Evaluation of integrals

UNIT IV: Partial differentiation:

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule- Taylor's and McLaurin'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} , $\sin ax \cos by$, $\cos ax \sin by$, $x^n y^n$ Classification of second order partial differential equations

Course Outcomes:

COs	Course Outcomes	BTL
CO1	Develop the ability to solve linear differential equations of first order and use the knowledge gain to certain engineering problems.	3
CO2	Develop the ability to solve linear differential equations of higher order and use the knowledge gain to certain engineering problems.	3
CO3	Compute the improper integrals using Beta and Gamma functions	3
CO4	Apply techniques of multivariable differential calculus to determine the extreme and series expansions etc. of the functions of several variables	3
CO5	Solving the first order Partial differential equations	3
CO6	Identify/classify and solve the different types of partial differential equations of first order and higher order	3

CO – PO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	2	1	1	-	-	-	-	-	-	-	-	1
2	3	2	1	-	-	-	-	-	-	-	-	1
3	3	2	1	-	-	-	-	-	-	-	-	1
4	2	1	1	-	-	-	-	-	-	-	-	1
5	1	1	1	-	-	-	-	-	-	-	-	1
6	1	1	1	-	-	-	-	-	-	-	-	1

CO – PSO Mapping

CO	PSO1	PSO2	PSO3
1	1	-	-
2	1	-	-
3	1	-	-
4	1	-	-
5	1	-	-
6	1	-	-

Text Books:

1. **B.S.Grewal**, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **T.K.V.Iyengar, B.Krishna Gandhi, S.Ranganathan, M.V.S.S.N.Prasad**, Engineering Mathematics (Volume-I), S Chand 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.

