

**BMA -101 MATHEMATICS –I**  
**I B.Tech, All Branches**  
**(Effective from Session 2017-18)**

**L T P C**  
**3 1 0 4**

**OBJECTIVE: The objective of this course is to educate the students about:**

- the convergence of infinite series, improper integrals and differential calculus.
- partial differentiation, multiple integrals and Beta, Gamma functions.
- vector calculus, matrices, linear algebra and optimization techniques.

**Course Outcome**

On the successful completion of the course, students will be able to

CO1	find nth derivative, determine the expansion of functions and find convergence of series and improper integrals.	Understand, Apply
CO2	find partial differentiation and evaluate area and volume using multiple integrals.	Apply, Evaluate
CO3	convert line integrals to surface integrals and volume integrals, determine potential functions for irrotational force fields.	Apply, Evaluate
CO4	solve linear system of equations and determine the eigen vectors of the matrix.	Apply, Analyse Evaluate,
CO5	learn concept of optimization and optimization techniques.	Apply, Analyse, Evaluate,

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	2	-	-	1	-	1	-	3
CO2	3	3	2	1	2	-	-	1	-	1	-	3
CO3	3	3	2	1	2	-	-	1	-	1	-	3
CO4	3	3	2	1	2	-	-	1	-	1	-	3
CO5	3	3	2	1	2	-	-	1	-	1	-	3
Average	3	3	2	1	2	-	-	1	-	1	-	3

1: Slight (Low)      2: Moderate (Medium)      3: Substantial (High) *If there is no correlation, put “-“*

**Detailed Syllabus:**

**Unit I- Functions of One Real Variable:**

Successive differentiation, Leibnitz theorem, Mean value theorems, sequences and series, Expansion of functions, Improper integrals and their convergence.

**Unit II- Functions of Several Real Variables:**

Limit, Continuity, Partial differentiation, Total differential and approximations, Jacobian, Euler’s theorem Expansion of functions, Beta and Gamma Functions, Multiple integral, Change of order, Change of variables, Applications to area, volume, mass, surface area etc. Dirichlet’s Integral & applications.

**Unit III- Vector Calculus:**

Point functions, differentiation, Gradient, Directional derivative, Divergence and Curl of a vector and their physical interpretations, Solenoidal & irrotational fields, Integration, Line, Surface and Volume integrals Green’s. Stoke’s and Gauss Divergence theorems (without proof) and applications.

**Unit IV- Matrices and Linear Algebra:**

Vector space and subspace, linear dependence, dimensions and basis, Linear transformation and its matrix representation, Elementary transformations, Echelon form, rank & nullity, Consistency of linear system of equations and their solutions, characteristic equation, Cayley Hamilton theorem, Real and complex eigenvalues and eigenvectors, diagonalisation, quadratic forms, complex, orthogonal, and unitary matrices, Application to Cryptography, discrete, Compartmental models and system stability.

**Unit V- Optimization:**

Engineering applications of optimization, statement and classification of optimization problems, Optimization techniques, single variable optimization, multi variable optimization with no constraint, with equality and inequality constraints, Linear Programming Problems, Graphical method and Simplex method.

**Books Recommended:**

1. R.K. Jain & S. R. K. Iyengar; Advanced Engineering Mathematics, Narosa Publishing House 2002.
2. Erwin Kreyszig: Advanced Engineering Mathematics. John Wiley & Sons 8<sup>th</sup> Edition.
3. Dennis G. Zill & Michael R Cullen; Advanced Engineering Mathematics, Jones & Bartlett Publishers, 2<sup>nd</sup> Edition.
4. S.S. Rao; Optimization: Theory & application Wiley Eastern Limited.
5. T.M. Apostol, calculus, Vol. I, 2<sup>nd</sup> ed., Wiley 1967.
6. T.M. Apostol, Calculus, Vol. II, 2<sup>nd</sup> ed., Wiley 1969.
7. Gilbert Strang, Linear Algebra & its applications, Nelson Engineering 2007.
8. Calculus & Analytic Geometry, Thomas and Finny.