Semester	Course Code	Course Title	Category
Semester –I	BSC103	Mathematics -1	Basic Science Course
Scheme and Credits			**Course contents**

L	T	P	Credits	(i) Calculus and Linear Algebra
3	1	0	4	

(i) Calculus and Linear Algebra

Detailed contents:
Module 1: Calculus: (6 lectures)
Evolutes and involutes; Evaluation of definite and improper integrals; Beta and Gamma functions and their properties; Applications of definite integrals to evaluate surface areas and volumes of revolutions.
Module 2: Calculus: (6 lectures)
Rolle's Theorem, Mean value theorems, Taylor's and Maclaurin theorems with remainders; indeterminate forms and L'Hospital's rule; Maxima and minima.
Module 3: Sequences and series: (10 lectures)
Convergence of sequence and series, tests for convergence; Power series, Taylor's series, series for exponential, trigonometric and logarithm functions; Fourier series: Half range sine and cosine series, Parseval's theorem.

Module 4: Multivariable Calculus (Differentiation): (8 lectures)
Limit, continuity and partial derivatives, directional derivatives, total derivative; Tangent plane and normal line; Maxima, minima and saddle points; Method of Lagrange multipliers; Gradient, curl and divergence.
Module 5: Matrices (10 lectures)
Inverse and rank of a matrix, rank-nullity theorem; System of linear equations; Symmetric, skew-symmetric and orthogonal matrices; Determinants; Eigenvalues and eigenvectors; Diagonalization of matrices; Cayley-Hamilton Theorem, and Orthogonal transformation.

Suggested Text/Reference Books
(i) G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002.
(ii) Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
(iii) Veerarajan T., Engineering Mathematics for first year, Tata McGraw-Hill, New Delhi, 2008.
(iv) Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, 11th Reprint, 2010.
(v) D. Poole, Linear Algebra: A Modern Introduction, 2nd Edition, Brooks/Cole, 2005.
(vi) N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
(vii) B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.

Course Outcomes
The objective of this course is to familiarize the prospective engineers with techniques in calculus, multivariate analysis and linear algebra. It aims to equip the students with standard concepts and tools at an intermediate to advanced level that will serve them well towards tackling more advanced level of mathematics and applications that they would find useful in their disciplines.
The students will learn:
To apply differential and integral calculus to notions of curvature and to improper integrals. Apart from some other applications they will have a basic understanding of Beta and Gamma functions.
The fallouts of Rolle's Theorem that is fundamental to application of analysis to Engineering problems.
The tool of power series and Fourier series for learning advanced Engineering Mathematics.
To deal with functions of several variables that are essential in most branches of engineering.
The essential tool of matrices and linear algebra in a comprehensive manner.

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