I Year-I Semester		L	T	P	C
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MATHEMATICS – I (BS1101)

Prerequisite Course: Knowledge and application of differentiation and integration

Course Description and Objectives:

This course will illuminate the students in the concepts of calculus, differential equations and multivariable calculus to handle various real world problems and their applications.

Course Outcomes:

Upon completion of the course, the student will be able to achieve the following outcomes.

CO	Course Outcomes	POs
1	Utilize mean value theorems to real life problems	4
2	Solve the differential equations related to various engineering fields	5
3	Familiarize with functions of several variables which is useful in optimization	4
4	Learn important tools of calculus in higher dimensions and will become familiar with 2- dimensional and 3-dimensional coordinate systems.	5
5	Apply double integration techniques in evaluating areas bounded by region	5

Syllabus:

UNIT I:

Sequences, Series and Mean value theorems:
Sequences and Series: Convergences and divergence – Ratio test – Comparison tests – Integral test – Cauchy's root test – Alternate series – Leibnitz's rule. Mean Value Theorems (without proofs): Rolle's Theorem – Lagrange's mean value theorem – Cauchy's mean value theorem – Taylor's and Maclaurin's theorems with remainders.

UNIT II:

Differential equations of first order and first degree:
Linear differential equations – Bernoulli's equations – Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay – Orthogonal trajectories – Electrical circuits.

UNIT III:

Linear differential equations of higher order:
Non-homogeneous equations of higher order with constant coefficients – with non-homogeneous term of the type e^{ax}, sin ax, cos ax, polynomials in x^n, e^{ax} V(x) and x^n V(x) – Method of Variation of parameters. Applications: LCR circuit, Simple Harmonic motion.

UNIT IV:

Partial differentiation:
Introduction – Homogeneous function – Euler's theorem – Total derivative – Chain rule – Jacobian – Functional dependence – Taylor's and Mc Laurent's series expansion of functions of two variables. Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

UNIT V:

Multiple integrals:
Double and Triple integrals – Change of order of integration – Change of variables. Applications: Finding Areas and Volumes.

TEXT BOOKS:
1. B. S. Grewal, Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. B. V. Ramana, Higher Engineering Mathematics, 2007 Edition, Tata Mc. Graw Hill Education.

REFERENCE BOOKS:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. Joel Hass, Christopher Heil and Maurice D. Weir, Thomas calculus, 14th Edition, Pearson.
3. Lawrence Turyn, Advanced Engineering Mathematics, CRC Press, 2013.
4. Srimantha Pal, S C Bhunia, Engineering Mathematics, Oxford University Press.