IC110 Engineering Mathematics

Credit: 2.5-0.5-0-3

Prerequisite: Consent of the faculty member

Students intended for: B.Tech. 1st year

Elective or Core: Core Semester: Even/Odd

Course objective: This course is an introduction to the basic concepts of differential and integral calculus and consideration of some of their engineering applications. This course introduces ordinary differential equations and show how they can be used to model the behavior of systems in engineering. The course also deals with the idea of infinite series and their convergence.

Course content:

- **Elementary calculus:** Zeno's Paradox Limit Continuity and Differentiability of single variables, Uniform continuity, Partial Derivatives. [2 Lectures]
- **Functions of Several Variables:** Limit Continuity and differentiability of functions of two variables. Euler's Theorem, Tangent plane and Normal, Change of variables, Chain rule.Jacobians, Taylor's Theorem for Two Variables, Strength of a Beam, Extrema of Functions of Two variables, Lagrange's method of undetermined multipliers. [10 Lectures]
- **Infinite Series:** Achelles' and Tortoise Problem, Convergence of Infinite Series of Real Numbers, Comparison Test, Ratio Test, root Test, Raabe's test, Logarithmic test, Demorgan's test, Sequence and series of functions: Uniform convergence and related tests. [6 Lectures]
- **Ordinary Differential Equations:** Origin of differential equations, Solution of linear differential equations with constant coefficients, Euler Cauchy Equations, Solution of Second Order differential Equations by change of dependent and independent variables, Method of variation of parameters for second order differential equations. [13 Lectures]
- **Integration:** Double integral and its applications. [5 Lectures]

Text Books:

Wilfred Kaplan, "*Advanced Calculus*", Pearson (2003).

George B. Thomas, Maurice D. Weir, Joel Hass, Frank R. Giordano, "*Thomas' Calculus*",Pearson, 11th Edition (2004).

Dennis Zill, Warren Wright, *"Advanced Engineering Mathematics"*, Jones& Bartlett Publisher, *4th Edition (2009).*

Reference Books:

Richard Courant, Herbert Robbins, Ian Stewart, "*What Is Mathematics? An Elementary Approach to Ideas and Methods*", 2nd Edition, Oxford University Press (1996).

H. T. H. Piaggio, "*An Elementary Treatise on Differential Equations*", Barman Press (2008).

E.Kreyszig, "*Advanced Engineering Mathematics*", 9th Edition, John Wiley (2007).