**Course structure of IC 110 (Engineering Mathematics)**

**Course Title**: Engineering Mathematics

**Subject Code**: IC 110

**Relative Weightage**: Tutorial (10%); 2 Quizzes (20% each); Attendance (5%); Final

Exam (45%)

**Credits**: 2.5-0.5-0-3 (L-T-P-C)

**Semester**: First

**Venue**: Lecture Hall 207

**Timings**: Lecture: Mon 8:00-8:50, Tue: 11:00-11:50, Thu: 11:00-11:50

**Instructor**: Dr. Rajendra Kr. Ray

**Email:** rajendra@iitmandi.ac.in

**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 will introduce ordinary differential equations and shows how they can be used to model the behaviour of systems in engineering. The course also deals with the idea of infinite series and their convergence.

**Elementary calculus:** Zeno’s Paradox Limit Continuity and Differentiability of single variables, Uniform continuity, Partial Derivatives. **2**

**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 Variable. Strength of a Beam, Extrema of Functions of Two variables, Lagrange’s method of undetermined multipliers. **9**

**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**

**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. **10**

**Multiple Integral:** Double and Triple Integrals, Change of Order of Integration, Change of Variables. Gamma, Beta Functions. Evaluation of Surface area, Volume, Center of Gravity, Moment of Inertia. **9**

**Text Books:**

1. E.Kreyszig**, “*Advanced Engineering Mathematics*”,** 9th Edition, John Wiley (2007).
2. George B. Thomas, Maurice D. Weir, Joel Hass, Frank R. Giordano**, “*Thomas' Calculus*”** Pearson, 11th Edition (2004).

**Reference Books:**

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