Semester V

Module Code: MATH-301
Module Title: **Real Analysis - I**
Module Rating: 3 Cr. Hours

Real Number System

- Ordered sets, fields, the field of real numbers
- Completeness property of R
- The extended real number system
- Euclidean spaces
- Finite, countable and uncountable sets

Sequences and Series

- Sequences, subsequences, convergent sequences, Cauchy sequences
- Monotone and bounded sequences, Bolzano Weierstrass theorem
- Series, series of non-negative terms
- Partial sums, the root and ratio tests, integral test, comparison test
- Absolute and conditional convergence

Limit and Continuity

- The limit of a function
- Continuous functions
- Types of discontinuity
- Uniform continuity
- Monotone functions

Differentiation

- The derivative of a function
- Mean value theorems, the continuity of derivatives
- Taylor's theorem

Functions of Several Variables

- Partial derivatives and differentiability, derivatives and differentials of composite functions
- Change in the order of partial derivative, implicit functions, inverse functions, Jacobians
- Maxima and minima

Recommended Books

1. W. Rudin, *Principles of Mathematical Analysis*, 3rd edition, (McGraw Hill, 1976)
2. R. G. Bartle, *Introduction to Real Analysis*, 3rd edition, (John Wiley and Sons, 2000)
3. T. M. Apostol, *Mathematical Analysis*, (Addison-Wesley Publishing Company, 1974)
4. A. J. Kosmala, *Introductory Mathematical Analysis*, (WCB Company , 1995)
5. W. R. Parzynski and P. W. Zipse, *Introduction to Mathematical Analysis*, (McGraw Hill Company, 1982)
6. H. S. Gaskill and P. P. Narayanaswami, *Elements of Real Analysis*, (Printice Hall, 1988)

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