

## DSE Courses of B.Sc. (Physical Sciences/Mathematical Sciences) Sem-VI

### Category-III

#### DISCIPLINE SPECIFIC ELECTIVE COURSE – 4(i): ELEMENTARY MATHEMATICAL ANALYSIS

#### CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Elementary Mathematical Analysis	4	3	1	0	Class XII pass with Mathematics	Discipline A-5: Elements of Real Analysis

**Learning Objectives:** The primary objective of this course is to introduce:

- Sequential criterion for limits and continuity of real-valued functions.
- Riemann integral of real-valued function  $f$  on  $[a, b]$  using Darboux sums.
- Pointwise and uniform convergence of sequences and series of functions.

**Learning Outcomes:** This course will enable the students to:

- Apply sequential continuity criterion for the proof of intermediate value theorem.
- Understand the basic tool used to calculate integrals
- Apply uniform convergence for term-by-term integration in power series expansion.

#### **SYLLABUS OF DSE-4(i)**

##### **UNIT-I: Continuous Functions**

**(12 hours)**

Sequential criterion for limits and continuity of functions, Continuity on intervals, Intermediate value theorem and applications; Uniform continuity.

##### **UNIT-II: The Riemann Integral**

**(15 hours)**

Riemann integration, criterion for integrability and examples; Integrability of continuous and monotone functions, Algebraic properties of the Riemann integral, Fundamental theorem of calculus (first form).

##### **UNIT-III: Uniform Convergence**

**(18 hours)**

Sequences and series of functions: Pointwise and uniform convergence, Uniform Cauchy criterion, Weierstrass M-test, Implications of uniform convergence in calculus; Power series, Radius and interval of convergence, Applications of Abel's theorem for power series.

#### **Essential Reading**

1. Denlinger, Charles G. (2011). Elements of Real Analysis. Jones & Bartlett India Pvt. Ltd. Student Edition. Reprinted 2015.

**Suggestive Readings**

- Bartle, Robert G., & Sherbert, Donald R. (2011). Introduction to Real Analysis (4th ed.). John Wiley & Sons. Wiley India Edition 2015.
- Ross, Kenneth A. (2013). Elementary Analysis: The Theory of Calculus (2nd ed.). Undergraduate Texts in Mathematics, Springer. Indian Reprint.