SEMESTER-IV

COURSE 4: INTRODUCTION TO REAL ANALYSIS

Theory

Credits: 4

5 hrs/week

CourseOutcomes

 $\label{eq:construction} After successful completion of this course, the student will be able to$

- 1. get clearideaabouttherealnumbersandrealvaluedfunctions.
- 2. obtaintheskillsofanalysingtheconceptsandapplyingappropriatemethodsfortesting convergence of a sequence/ series.
- 3. testthecontinuity and differentiability and Riemannintegration of a function.
- 4. knowthegeometricalinterpretationofmeanvalue theorems.
- 5. know about the fundamental theorem of integral calculus

Course Contents

Unit – 1

REALNUMBERS, REAL SEQUENCES

The algebraic and order properties of R - Absolute value and Real line - Completeness property of R - Applications of supremum property - intervals. (**No question is to be set from this portion**) Sequences and their limits -Range and Boundedness of Sequences - Limit of a sequence and Convergent sequence -The Cauchy's criterion - properly divergent sequences - Monotone sequences - Necessary and Sufficient condition for Convergence of Monotone Sequence - Limit Point of Sequence -Subsequencesand the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence.

Unit – 2

INFINITIE SERIES

Introductiontoseries -convergenceofseries -Cauchy'sgeneralprincipleof convergencefor series tests for convergence of series - Series of non-negative terms - P-test - Cauchy'snth roottest -D'-Alembert'sTest-AlternatingSeries-Leibnitz Test.

Unit –3

LIMIT & CONTINUITY

Real valued Functions - Boundedness of a function - Limits of functions - Some extensions of the limit concept - Infinite Limits - Limits at infinity (**No question is to be set from this portion**).Continuous functions - Combinations of continuous functions - Continuous Functions on intervals - uniform continuity.

Unit – 4

DIFFERENTIATION ANDMEANVALUETHEORMS

The derivability of a function at a point and and on an interval - Derivability and continuity of a function -MeanvalueTheorems -Rolle'sTheorem,Lagrange's Theorem, Cauchy's Mean value Theorem

Unit – 5

RIEMANNINTEGRATION

Riemann Integral - Riemann integral functions - Darboux theorem -Necessary and sufficientcondition for R integrability - Properties of integrable functions - Fundamental theorem of integral calculus - integral as the limit of a sum - Mean value Theorems.

Activities

Seminar/ Quiz/ Assignments/ Applications of Real Analysis to Real life Problem /Problem Solving Sessions.

TextBook

An Introduction to Real Analysis by Robert G.Bartle and Donlad R. Sherbert, John Wiley and sonsPvt. Ltd

ReferenceBooks

- 1. ElementsofRealAnalysis by ShanthiNarayan andDr.M.D.Raisinghania, S. Chand & Company Pvt. Ltd., New Delhi.
- 2. Principles of Mathematical Analysis by Walter Rudin, McGraw-Hill Ltd.
