

COURSE OBJECTIVES: To enable the students to –

- a. Know and understand the definition and theorems of Real Analysis
- b. Apply mathematical concepts and principles to perform numerical and symbolic computations.
- c. Prove properties of convergent and divergent sequence.
- d. Verify the given sequence in convergent and divergent by using behavior of Monotonic sequence.
- e. Prove Cauchy's first limit theorem, Cesaro's theorem, Cauchy's Second limit theorem.
- f. Explain subsequences, upper and lower limits of a sequence.
- g. Give examples for convergence, divergence and oscillating series.
- h. Prove theorems on different test of convergence and divergence of a series of positive terms.
- i. Verify the given series is convergent or divergent by using different test and To inculcate knowledge on real numbers and their properties & proofs.
- j. Compare with other fields like engineering , physics and other allied sciences.

COURSE OUTCOMES : At the end of the course student will -

- **CO1:**Be able to gain knowledge and concepts of Real analysis and it's applications
- **CO2:**Develop a higher level of mathematical knowledge combined with the ability to think analytically
- **CO3:**Ability to understand the different math concepts and be able to implement them in our everyday problems
- **CO4:**Be able to write simple proofs on their own and study bigger theorems
- **CO5:**Be able to demonstrate the power to integrate data and ideas of differentiation and integration during a coherent and substantive manner and use acceptable techniques for resolution connected issues and establishing theoretical results
- **CO6:**Gain Knowledge of fundamental concepts of real numbers.
- **CO7:**Verify the value of the limit of a function at a point using the definition of the limit
- **CO8:**Learn to check function is continuous understand the consequences of the intermediate value theorem for continuous functions
- **CO9:**Apply the knowledge in higher studies like P.G. and Research.

COURSE SYLLABUS :

UNIT – I : REAL NUMBERS :The algebraic and order properties of \mathbb{R} , Absolute value and Real line, Completeness property of \mathbb{R} , Applications of supremum property; intervals. (No question is to be set from this portion).

REAL SEQUENCES: 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, Subsequences and the Bolzano-weierstrass theorem – Cauchy Sequences – Cauchy's general principle of convergence theorem.

UNIT –II : INFINITIE SERIES : SERIES :Introduction to series, convergence of series. Cauchy's general principle of convergence for series tests for convergence of series, Series of Non-Negative Terms.

1. P-test
2. Cauchy's nth root test or Root Test.
3. D'-Alemberts' Test or Ratio Test.
4. Alternating Series – Leibnitz Test.

Absolute convergence and conditional convergence.

UNIT – III : CONTINUITY : LIMITS :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 :Continuous functions, Combinations of continuous functions, Continuous Functions on intervals, uniform continuity.

UNIT – IV : DIFFERENTIATION AND MEAN VALUE THEORMS :

The derivability of a function, on an interval, at a point, Derivability and continuity of a function, Graphical meaning of the Derivative, Mean value Theorems; Rolle's Theorem, Lagrange's Theorem, Cauchy's Mean value Theorem.

UNIT – V : RIEMANN INTEGRATION : Riemann Integral, Riemann integral functions, Darboux theorem. Necessary and sufficient condition for R – integrability, Properties of integrable functions, Fundamental theorem of integral calculus, integral as the limit of a sum, Mean value Theorems.

CO-CURRICULAR ACTIVITIES : Seminar/ Quiz/ Assignments/ Real Analysis and its applications / Problem Solving.

TEXT BOOK:Introduction to Real Analysis by Robert G.Bartle and Donlad R. Sherbert, published by John Wiley.

REFERENCE BOOKS :

1. Real Analysis by Rabert&Bartely and .D.R. Sherbart, Published by John Wiley. (1997)
2. A Text Book of B.Sc Mathematics by B.V.S.S. Sarma and others, Published by S. Chand & Company Pvt. Ltd., New Delhi.(2007)
3. Elements of Real Analysis as per UGC Syllabus by Shanthi Narayan and Dr. M.D. Raisingkania Published by S. Chand & Company Pvt. Ltd., New Delhi. (2006)