COURSE OBJECTIVES: To enable the students to -

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

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

- CO1:Apply theoretical / analytical / statistical knowledge gained in various courses of B.Sc to solve numerical problems based on real life situations during practicals and draw meaningful solutions to day to day problems
- **CO2:**Enabling students to develop a positive attitude towards mathematics as an interesting and valuable subject of study
- CO3:Enhancing students overall development and to equip them with mathematical abilities, problem solving skills, creative talent and power of communication necessary for various kinds of employment.
- **CO4:**Problem solving on Real Numbers, Sequences, Series, Continuity, Differentiation, Mean Value Theorems and Riemann Integration
- **CO5:**Be able to gain knowledge and concepts of Real analysis and it's applications
- **CO6**:Develop a higher level of mathematical knowledge combined with the ability to think analytically
- **CO7:**Ability to understand the different math concepts and be able to implement them in our everyday problems
- **CO8:**Be able to write simple proofs on their own and study bigger theorems
- **CO9:**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
- **CO10:**Apply the knowledge in higher studies like P.G. and Research.

COURSE SYLLABUS :

UNIT – I : REAL NUMBERS : 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).

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)
- 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)

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