The Cluster University of Srinagar
Syllabus for 3rd semester Mathematics

Semester-III **Subjects:** Mathematics
Course title: Real Analysis **End-term examination**: 56
Course code: **Internal assessment**: 30
Total credits: 06 **Attendance**: 04

Unit-I

Finite & infinite sets, countable & uncountable sets with examples, proof of countability of rationals and unaccountability of reals, bounded & unbounded sets, infumum & supremum of a set, set of rationals is not order complete, completeness property of real numbers, Archimedean property, limit point of a set.

Unit-II

Sequences, bounded sequences, convergence of a sequence, Cauchy's principle of convergence, Cauchy sequence, cluster point of a sequence, limit of a convergent sequence is unique, monotonic sequence and their convergence, Bolzano Weierstrass theorem, nested interval theorem, limit superior & limit inferior

Unit-III

Infinite series, partial sums, convergence of a series, Cauchy's convergence principle for series, convergence of $\sum 1/n^p,\ p > 1$, comparison test, D'Alembert's Ratio test, Cauchy's root test, alternating series, Lebnitz test, conditional convergence with examples.

Unit-IV

Riemann integration, upper & lower R-sums, refinement of a partition, behaviour of lower & upper R-sums under refinement, R-integrable functions, examples of bounded functions which are not R-integrable, necessary & sufficient condition for R-integrability of a bounded function, R-integrability of sum, difference, product of two functions, if f is R-itegrible on $[a, b]$ then so is $|f|$ and $|\int_a^b f dx| \leq \int_a^b |f| dx$, every bounded continuous/monotonic function is R-integrable.

Text Books Recommended

(1) *Introduction to Real Analysis* by Robert G. Bartle & Donald R. Sherbert

(2) *Mathematical Analysis* By S.C. Malik & Savita Arora