

B.Sc. DEGREE PROGRAMME
MATHEMATICS (CORE COURSE)
SIXTH SEMESTER
MM6B09 : REAL ANALYSIS

5 hours/week

4 credits

30 weightage

Text :

G. Bartle, Donald R. Sherbert : Introduction to Real Analysis (3rd Edn.).

Module I : Continuous Functions (25 hrs)

Continuous functions (a quick review)

Continuous functions on intervals

Uniform continuity

(Sec. 5.3, 5.4)

Module II : Riemann Integral (25 hrs)

Riemann Integral

Riemann Integrable Functions

The fundamental theorem

Substitution theorem and application

(Sec. 7.1, 7.2, 7.3 (upto 7.3.9)).

Module III : Sequence and series of functions (20 hrs)

A quick review of series of real numbers.

Pointwise and uniform convergence.

Interchange of limit and continuity.

Series of functions

(8.1, 8.2.1, 8.2.2, 9.4.1, 9.4.2, 9.4.5, 9.4.6)

Module IV (20 hrs)

Improper Integrals

Text: R.R. Goldberg : Methods of Real Analysis.

(Sections: 7.9, 7.10)

Beta and Gamma functions

Text: Narayanan & Manicavachagom Pillay : Calculus, Vol. II (Chapter IX, Sec: 2.1, 2.2, 2.3, 3, 4, 5)

References

1. J.V. Deshpande: Mathematical Analysis and Applications, Narosa Pub. House.
2. Terence Tao : Analysis I, TRIM 37, Hindustan Book Agency.
3. K.A. Ross: Elementary Real Analysis : Theory of Calculus, Springer.
4. K.G. Binmore: Mathematical Analysis, CUP.

Seminar Topics

Sequential criterion for limit of a function – divergence criteria – properties of limits using sequential criterion – squeeze theorem – Caratheodory's theorem for differentiable functions (Theorem 6.1.5), Chain rule (Theorem 6.1.6), Inverse function theorem (6.1.8 & 6.1.9); Taylor's theorem (Theorem 6.4.1) – Bolzano-Weierstrass theorem for bounded infinite sets – proof of nested intervals theorem using monotone sequence theorem – limit superior and limit inferior of sequence of real numbers (treatment as in R. Goldberg: Methods of Real Analysis).