# 15 MMCC 101 REAL ANALYSIS (3-1-0)

### Module – I : (14 Hours)

Introduction to Metric spaces, compact set, connected set, Weistrass Approximation Theorem, Sequence and series of function, Uniform convergence.Lebesgue measure: Introduction, outer measure, measurable sets and Lebesgue measure, A non measurable set, measurable function.The Lebesgue Integral: The Rimann integral, The Lebesgue integral of a bounded function over a set of finite measure, The integral of a non negative function, The general Lebesgue integral.

### Module –II : (14 Hours)

Measure and Integration: measure spaces, measureable functions, Integration, General convergence theorem, Signed measures, The Random-Nikodyn theorem, The L<sup>p</sup> spaces.

Measure and Outer measure: Outer measure and measurability, The extension theorem, The Lebesgue-Stieltjes integral, Product measures, Integral operators, Inner measure, Extension by sets measure zero.

### Module –III : (12 Hours)

Introduction - Properties of monotonic functions - Functions of bounded variation - Total variation - Additive property of total variation - Total variation on [a, x] as a function of x - Functions of bounded variation expressed as the difference of two increasing functions - Continuous functions of bounded variation.

The Riemann Stieltjes Integrals: Introduction, Notation, The definition of Riemann Stieltjes Integral, Linear operators, Integration by parts, Change of variable in Riemann Stetiltjes integrals, Reduction to a Riemann Integral, Euler's summation formula, Monotonically increasing integrals.

#### **Text Book :**

 Real Analysis by H.L Royden(3<sup>rd</sup> edition) Chapter 3(3.1 to 3.5), Chapter(4.1 to 4.4), Chapter(11), Chapter(12.1 to 12.7).
Mathematical analysis by Tom M.Apostol,2<sup>nd</sup> Edition,Addison-Wesley publication company Inc. Newyork,1974. Chapter6(6.1 to 6.8), Chapter7(7.1 to 7.11)

## **Reference Book :**

1. Bartle, R.G. Real Analysis, John Wiley and Sons Inc., 1976.

2. Rudin, W. Principles of Mathematical Analysis, 3rd Edition. McGraw Hill Company, New York, 1976.

3. Malik,S.C. and Savita Arora. Mathematical Anslysis, Wiley Eastern Limited.New Delhi, 1991.

4. Sanjay Arora and Bansi Lal, Introduction to Real Analysis, Satya Prakashan, New Delhi, 1991.

5. Gelbaum, B.R. and J. Olmsted, Counter Examples in Analysis, Holden day, San Francisco, 1964.