

MMA-C113
ADVANCED REAL ANALYSIS

MM : 100
Time : 3 hrs
L T P
5 2 0

Sessional : 30
ESE : 70
Pass Marks : 40

NOTE: The question paper shall consist of two sections (Sec.-A and Sec.-B). Sec.-A shall contain 10 short answer type questions of six marks each and student shall be required to attempt any five questions. Sec.-B shall contain 8 descriptive type questions of ten marks each and student shall be required to attempt any four questions. Questions shall be uniformly distributed from the entire syllabus. The previous year paper/model paper can be used as a guideline and the following syllabus should be strictly followed while setting the question paper.

Sequences and series of real valued functions, Pointwise and uniform convergence of sequences of functions, Pointwise and uniform convergence of series of functions, Continuity, Integrability and differentiability by means of uniform convergence.

Equivalent sets, Countable and uncountable sets, Length of sets, Lebesgue outer measure of sets, Lebesgue measurable sets and their properties, Boolean algebra of sets, σ -Boolean algebra, Borel sets and their measurability, Further properties of measurable sets, Characterization of measurable sets.

Measurable functions and their properties, Algebra of Measurable functions, Step function, Max and min functions, Positive and negative parts of a function, Characteristics function, Simple function, Continuity of a function over measurable sets, Sets of measure zero, Almost everywhere property, Egoroff's theorem, Lusin theorem, Frechet theorem, Convergence in measure, Riesz theorem, Fundamental in measure.

Lebesgue Integral of a bounded function, Relation between Riemann and Lebesgue Integrals, Properties of Lebesgue integrals on bounded measurable functions, Bounded convergence theorem, Integral of nonnegative measurable function, Fatou's lemma, Monotone convergence theorem, Integrable functions, General Lebesgue integral, Lebesgue dominated convergence theorem.

Text /Reference Books

1. P.K. Jain and V.P. Gupta, Lebesgue Measure and Integration, New Age International.
2. H. L. Roydon, Real Analysis, Prentice Hall.
3. Walter Rudin, Principles of Mathematical Analysis, McGraw Hill.
4. Robert Bartle, The elements of integration and Lebesgue measure, Wiley Classics Library.
5. Gerald Folland, Real Analysis, Modern Techniques and Their Application, Wiley.
6. S. C. Malik and S. Arora, Mathematical Analysis, New Age International.