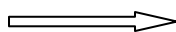


M.A/M.Sc Mathematics Semester 3rd

Effective from academic session 2011



Repetition for 2012 with minor change

ABSTRACT MEASURE THEORY

Course No. MM-OP-304

Unit-I

Semiring, algebra and σ -algebra of sets, Borel sets, measures on semirings, outer measure associated with a set function and basic properties, measurable sets associated with an outer measure as a σ -algebra, construction of the Lebesgue measure on R^n .

Unit-II

For $f \in L_1 [a, b]$, $F' = f$ a.e. on $[a, b]$. If f is absolutely continuous on (a, b) with $f(x) = 0$ a.e., then $f = \text{constant}$. Characterization of an absolutely continuous function as an indefinite Lebesgue integral. Non-Lebesgue integrability of f where $f(x) = x^2 \sin(1/x^2)$, $f(0) = 0$ on $[0, 1]$. Fundamental theorem of calculus for the Lebesgue integral. A brief introduction to L_p spaces. Holder's and Minkowski's inequalities.

Unit-III

Improper Riemann integral as a Lebesgue integral, calculation of some improper Riemann integrable functions, space of Lebesgue integrable functions as completion of Riemann integrable functions on $[a, b]$, change of variables formula and simple consequences, Riemann Lebesgue lemma.

Unit-IV

Product measures and iterated integrals, example of non-integrable functions whose iterated integrals exist (and are equal), Fubini theorem, expressing a double integral as an iterated integral, Tonelli-Hobson theorem as a converse to Fubini theorem, differentiation under the integral sign.

Recommended Books:

- 1.C.D.Aliprantis and O.Burkinshaw, Principles of Real Analysis
- 2.Goldberg, R. : Methods of Real Analysis
- 3.T.M.Apostol : Mathematical Analysis

Suggested Readings:

- 1.Royden, L: Real Analysis (PHI)
- 2.Chae, S.B. Lebesgue Integration(Springer Verlag).
- 3.Rudin, W. Principles of Mathematical Analysis(McGraw Hill).
- 4.Barra, De. G. : Measure theory and Integration (Narosa)
- 5.Rana, I.K. : An Introduction to Measure and Integration, Narosa Publications.

