

DEPARTMENT OF MATHEMATICS
COCHIN UNIVERSITY OF SCIENCE & TECHNOLOGY
COCHIN – 22.

M.SC MATHEMATICS – III SEMESTER

MAM 2301 FUNCTIONAL ANALYSIS – II

- UNIT – I** Spectrum of a Bounded Linear Operator, compact linear maps, spectrum of a compact linear operator (pp.192-216, 302-333)
- UNIT – II** Fredholm Alternatives, Approximate solutions (pp.333-366)
- UNIT – III** Bounded operators and Adjoints, Normal, Unitary and Self-Adjoint Operators, Spectrum and Numerical range (pp. 441 – 504)
- UNIT – IV** Compact Self-Adjoint operators (pp.504-528)
- UNIT – V** Sturin – Liouville Problems (pp.553 – 570)

TEXT BOOK

Functional Analysis (second edition by Balmohan V.Limaye. Chapters 3, 5, 7 and Appendix C, Publishers : New Age International Limited (1996)

MAM 2302 COMPLEX ANALYSIS II

- UNIT – I** Partial Fractions, Infinite Products, Canonical Products. The Gamma Function, Stirling's Formula, Entire Functions, Jensen's Formula, Hadamard's Theorem (without proof) (Chapter 5 Sections 2,3)
- UNIT – II** Riemann Mapping Theorem, Boundary Behaviour, Use of Reflection Principle, Analytic Arcs, Conformal Mapping of Polygons, The Schwarz-Christoffel Formula, Mapping on a Rectangle, The Triangle Functions of Schwarz. (Chapter 6 Sections 1,2)
- UNIT – III** Functions with the Mean-value Property, Harnack's Principle, Subharmonic Functions, Solution of Dirichlet's Problem (Chapter 6 Sections 3,4)
- UNIT – IV** Simply Periodic Functions, Doubly Periodic Functions, Unimodular Transformations, Canonical Basis, General Properties of Elliptic Functions, The Weierstrass \wp -Function, The functions $\zeta(z)$ and $\sigma(z)$, The Modular Function, Conformal Mapping by $\lambda(\tau)$ (Chapter 7)
- UNIT – V** Analytic Continuation, Germs and Sheaves, Sections and Riemann Surfaces, Analytic Continuations along Arcs, Homotopic Curves Monodromy Theorem, Branch Points, Picard's Theorem (Chapter 8 Sections 1,3)

TEXT BOOK

V.Ahlfors – Complex Analysis (Third Edition) McGraw Hill International

MAM 2303 PARTIAL DIFFERENTIAL EQUATIONS

- UNIT – I** First order partial different equations (PDE): Curves and surfaces, classification of integrals, linear equations, Pfaffian equations, compatible systems Charpit’s Method, Jacob’s Method [Chapter 1 (Sections 1.1 – 1.8).
- UNIT – II** Integral surfaces through a given curve, Quasilinear equations, nonlinear equations [Chapter 1 (Sections 1.9, 1.10, 1.11)]
- UNIT – III** Second Order equations: Classification, One-dimensional wave equation [Chapter 2 (Sections 2.1, 2.2, 2.3)]
- UNIT – IV** Laplace’s Equation [Chapter 2 (section 2.4)]
- UNIT – V** Heat conduction problem, Duhamel’s principle, families of equipotential surfaces, Kelvin’s inversion theorem [Chapter 2 (Sections 2.5, 2.6, 2.8, 2.9)]

TEXT BOOK

T. Amarnath – An elementary course in partial differential equations. Second Edition. Narosa Publishing house, 2003.

REFERENCE

- [1] Ian Sneddon – elements of Partial Differential Equations, McGraw Hill, 1983.
[2] Phoolan Prasad and Renuka Ravindran – Partial Differential Equations, New

MAM 2304 PROBABILITY THEORY I

- UNIT – I** Probability Spaces – Dynkin’s theorem, Construction of Probability Spaces, Measure Construction.
Random variables, Elements and Measurable maps – Inverse maps, Measurable Maps, Random Elements, Measurability and Continuity, Sigma fields generated by maps (Chapters 2 & 3 of text book 1)
- UNIT – II** Independence – Records, ranks and Renyi’s theorem, Groupings, Borel-Cantellilemma, 0-1 laws integration and expectation – Transformation theorem and densities, product spaces, independence and Fubini’s Theorem (Chapters 4 & 5 [except 5.6] of text book 1)
- UNIT - III** Convergence – A.S., convergence in probability, L_p convergence.
Laws of large numbers and sums of independent random variables – Truncation and equivalence, General Weak Law of Large Numbers, Almost sure convergence of sums of independent random variables (Chapters 6 & 7 [except 6.4, 6.6] of text book 1)
- UNIT – IV** Strong law of large numbers for iid sequences, applications, Kolmogorov Three Series Theorem, Convergence in distribution – Scheffe’s Lemma, Baby Skorohod Theorem, Relations among modes of convergence (Sections 7.4 to 7.6 [except 7.6.1], 8.1, 8.2 [except 8.2.1], 8.3, 8.5 of text book 1)
- UNIT – V** Characteristic Functions and CLT – MGF and CLT, Expansions, Moments and Derivatives, Uniqueness and Continuity, Classical CLT for iid rvs, Lindeberg-Feller CLT (all section of Chapter 9 [except proofs of results in section 9.6.1, 9.6.2 & 9.6.3] of text book 1)

TEXT BOOKS

- [1] A Probability path – S.I. Resnick, (Birkhauser (1999))

REFERENCE

- [1] A.K. Basu – Probability Theory, Prentice Hall India 2002
[2] P.Billingsley – Probability, John Wiley (1968), (Reprint) 2000
[3] K.L. Chung – Elementary Probability Theory, Narosa
[4] W.Feller – Introduction to Probability Theory and Applications Vols. I & II, John Wiley, 1968.
[5] V.S. Borkar – Probability Theory, Springer 1995.

MAM 2316 – TOPOLOGY II

- UNIT – I Homotopy, Fundamental Group, Covering Spaces.
- UNIT – II Geometry of Simplicial Complexes, Barycentric subdivisions, Simplicial approximation theorem.
- UNIT – III Fundamental group of a Simplicial complex, Differentiable manifolds.
- UNIT – IV Differential forms.
- UNIT –V Simplicial Homology, De Rham's Theorem.

TEXT BOOK

I.M..Singer and J.A.Thorpe – Lecture Notes on Elementary Topology and Geometry (Springer Verlag 1967)

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