

SCHOOL OF MATHEMATICS

PH114 Advance Course in Mathematics

Unit I:

Functions of Several Variables, derivatives in an open subset of \mathbb{R}^n , chain rule, partial derivatives, the contraction principle, inverse function theorem, implicit function theorem. Convex sets, Convex hulls, Closure and interior of a set, Weierstrass theorem.

[3][4]

Unit II:

Separation and supports of sets, Convex cones and polarity, Polyhedral set, extreme points and extreme directions, Definitions and Basic Properties of convex functions, Subgradients of Convex Functions, Differentiable Convex Functions, Minima and Maxima of Convex Functions, Generalizations of Convex Functions.

[3][4]

Unit III:

Theoretical and computational aspects of Canonical forms, Hermite form, Smith normal form.

[2]

Unit IV:

Methods in Commutative Algebra: Localization, Completion, Primary decomposition, Dimension theorem.

[1]

Unit V:

Characters of finite abelian groups, The character group, Dirichlet characters, Sums involving Dirichlet characters, Dirichlet's theorem on primes in arithmetic progressions.

[2][5]

Recommended Books:

1. Introduction to Commutative Algebra, Atiyah & Mc Donald.
2. An approach via module theory, Adkiss & Weintraub.
3. Principles of Mathematical Analysis, Walter Rudin.
4. Nonlinear Programming, Bazaraa M.S., Sherali H.D., Shetty C.M.
5. Introduction to Analytic Number Theory, T. M. Apostol.