

MA-638 ALGEBRAIC CODING THEORY (M.Phil./Ph.D.) (Cr. 3)

1. Basics:

Commutative rings, Integral domains and Fields, Homomorphisms and ideals, Quotient Rings, Polynomial rings in one indeterminate, Prime Ideals and Maximal Ideals, Irreducible Polynomials, PID, Field extensions, Galois Field.

2. Linear Codes: Block Codes, Linear Codes, Hamming Codes.

3. Reed-Solomon: Definition of RS code, Algebraic Decoding.

4. BCH Codes: Primitive and non primitive BCH Codes, Shortening and extending BCH codes, Relationship between BCH and RS codes, Decoding of BCH codes.

5. Classical Goppa Codes: Definition, The minimum distance of Goppa codes, Decoding Goppa codes.

RECOMMENDED BOOKS:

- a) M.F. Atiyah and I.G. McDonald, "Introduction to Commutative Algebra", Addison-Wesley, 1969.
- b) Martin Bossert, "Channel Codings for Telecommunications" John Wiley & Sons, Inc., New York (1999).
- c) David S. Dummit and Richard M. Foote, "Abstract Algebra". John Wiley & Sons, Inc., New York (2002).
- d) W.J. Gilbert and W.K. Nicholson, "Modern Algebra with Applications" Wiley-Interscience, New Jersey, (2004).
- e) J.H. Lint, "Introduction to Coding Theory". 3rd Edition, Springer, Heidelberg. (2004)