13-EC 533 CODING THEORY

SYLLABUS

Coding for Reliable Transmission: Mathematical model of Information, A Logarithmic Measure of Information, Average and Mutual Information, Types of Errors, Error Control Strategies. Linear Block Codes: Introduction to Linear Block Codes, Syndrome and Error Detection, Minimum Distance of a Block code, Error-Detecting and Error-correcting Capabilities of a Block code, Standard array and Syndrome Decoding, Probability of an undetected error for Linear Codes over a BSC, Hamming Codes. **Cyclic codes**: Description, Generator and Parity-check Matrices, Encoding, Syndrome Computation and Error Detection, Decoding ,Cyclic Hamming Codes, Shortened cyclic codes, Majority logic decoding for cyclic codes. **Convolution codes**: Encoding of Convolution Codes, Structural and Distance Properties, maximum likelihood decoding, Sequential decoding, Majority- logic decoding of Convolution codes. Application of Viterbi Decoding and Sequential Decoding **Burst –Error-Correcting codes**: Decoding of Single-Burst error Correcting Cyclic codes, Single-Burst-Error-Correcting Cyclic codes, Burst-Error-Correcting Convoulutional Codes, Bounds on Burst Error-Correcting Capability, Interleaved Cyclic and Convolution Codes , Phased-Burst –Error-Correcting Cyclic and Convolution codes. **BCH – Codes:** BCH code-Definition, Minimum distance and BCH Bounds, Decoding Procedure for BCH Codes-Syndrome Computation and Iterative Algorithms, Error Location Polynomials and Numbers for single and double error correction

TEXT BOOKS

1.K. Sam Shanmugam **,''Digital and analog communication systems'',** John Wiley, 1996.
2.Simon Haykin **,"Digital communication**'' , John Wiley, 2003.
3.Shu Lin, Daniel J.Costello, Jr, "Error Control Coding- Fundamentals and Applications'' – Prentice Hall, Inc.
4.Error Correcting Coding Theory-Man Young Rhee- 1989, McGraw-Hill Publishing.

REFERENCES

1.Digital Communications-Fundamental and Application - Bernard Sklar, PE.
2.Digital Communications- John G. Proakis, 5th ed., 2008, TMH.
3.Introduction to Error Control Codes-Salvatore Gravano-oxford
4.Error Correction Coding – Mathematical Methods and Algorithms – Todd K.Moon, 2006, Wiley
5.Information Theory, Coding and Cryptography – Ranjan Bose, 2nd Edition, 2009, TMH.