Coding and Information Theory
Code: EC 703
Credit: 4

Module 1. Introduction:
Coding for reliable digital transmission and storage, Types of codes, Types of errors encountered,
Error Control Strategies.

Module 2. Linear block codes:
Definition, Syndrome and Error detection, Minimum distance,
Error detecting and Error-correcting capabilities, Standard Array and Syndrome decoding,
Probability of an undetected error for linear codes over BSC, Hamming code.

Module 3. Cyclic codes:
Description, Generator & parity-check matrices of cyclic codes, Encoding of cyclic codes, Syndrome
computation and error detection, Decoding, Cyclic Hamming Codes, Shortened cyclic codes.

Module 4. BCH codes:
Description, Decoding BCH codes, Implementation of error correction, Non binary BCH codes and
Reed-Solomon codes, Weight distribution and Error detection of Binary BCH codes.

Module 5. Convolution codes:
Encoding, Structural properties, Distance properties, Maximum likelihood decoding of convolution
codes, Viterbi algorithm, Performance bound for convolution codes, Application of Viterbi decoding.

Module 6. Information Theory
Basic Definition, Information & Entropy, Shannon’s Charred Capacity Theorem, Source encoding,
Channel capacity of a discrete memoriless channel, Channel capacity of a continuous channel.

Module 7. Cryptography & Cryptosystems
Encryption & decryption, Public & private key cryptography, DES algorithm, RSA algorithm, Diffy-
Hellman key exchange, Introduction of quantum cryptography, Applications of cryptography in
network security.