INFORMATION THEORY AND CODING (EC-031)

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OBJECTIVE OF COURSE:

1. To give an overview of information theory in digital communication systems.
2. To introduce the basic concepts of error control codes used in digital communication with it's application

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PREREQUISITES OF COURSE:

1. Digital Communication
2. Signals & Systems
3. Wireless Communication
4. Engineering Mathematics

UNIT-I

Discrete messages, sampling Theorem, concept of entropy, marginal, joint, information rate, bit rate/baud rate. Coding to increase average information per bit, Shannon fanon algorithm, Hoffman coding, channel capacity, Shannon theorems, capacity of Gaussian channel, bandwidth, S/N trade-off, Efficiency of orthogonal signal transmission

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UNIT-II & IV

Introduction to coding, error detecting,/correcting codes, concepts of codes, length, minimum distance, weight, Binary symmetric channels, equivalence of codes, block codes, perfect codes, bar codes, ISBN codes, linear codes, encoding and decoding with a linear code, error correction, parity bit, parity check matrix, syndrome decoding, hamming codes, extended binary hamming codes, cyclic codes, cyclic redundancy check, convolution coding, decoding, Probability of error of convolution codes, orthogonal codes.

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UNIT-III

Auto & cross correlation functions, generation algorithm of Prime, quasi prime codes, optical orthogonal codes, decoding schemes, S/N performance, automatic repeat request(ARQ) schemes, data compression codes, data encryption and decryption

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UNIT-V

Application of information theory and optimum modulation system ,comparison of AM system with the optimum system ,comparison of F.M with the optimum system, comparison of PCM and FM, Feedback communication, Trellis decoded modulation

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TEXT BOOKS:

1. Taub and Schilling, Second Edition, Principles of communication systems, Tata McGraw Hill Publication, India
2. Bernard Sklar, Digital Communication Fundamentals and Application, Second Edition, Pearson Publication, India

References:

1. Shulin and Costello, Error Correcting Codes, 2nd Edition, Prentice Hall of India Print.
2. Dr. P.S Sathyanarayana, Probability, Informations and coding theory, Dynaram Publications, Bangalore.
3. John G. Prokis, Digital Communication, 4th Edition, Tata McGraw Hill Publication, India

OUTCOME

On completion of this course the student will understand

1. Digital Communication fundamentals
2. Different error control coding techniques.