

B.E. ELECTRONICS ENGINEERING

FOURTH YEAR SEMESTER VII

SUBJECT: Digital Communication

Lectures: 3 Hrs per week
Practical: 2 Hrs per week

Theory: 100 Marks
Term Work: 25 Marks
Oral: 25Marks

Rationale: The increase in demand for data transmission coupled with the availability of wideband communication channels and sophisticated integrated circuits have led to the development of efficient and reliable digital communication.

DETAILED SYLLABUS

Random variables

Review of probability theory, communications examples , Random variables, probability Distribution function , probability density function, joint cumulative distribution and probability density, average value and variance of a random variable, The error function, The Gaussian probability density The Rayleigh probability density, The central limit theorem.

Information Theory

Discrete messages, the concept of amount of Information, Entropy, Information rate, coding to increase Average Information per bit - Huffman coding, Lempel Ziv coding Shannon's Theorem, Channel capacity, capacity of a Gaussian channel, Bandwidth - S/N trade - off.

Error control coding

Rationale for coding and types of codes, Discrete memoryless channel , some Algebraic concepts - code efficiency and Hamming bound , linear block codes, Cyclic codes, Convolutional codes , maximum likelihood decoding of convolutional codes.

Baseband shaping for data transmission

Discrete PAM signals, Power spectra of discrete PAM signals, Intersymbol Interference, Nyquist's criteria for distortionless baseband, Binary transmission, correlative coding eyepattern , Baseband M - ary PAM systems.

Baseband Detection

Correlation receiver, Matched filter receiver, Detection of signals with unknown phase in noise, Equalization concepts [no algorithms expected], Tapped - Delay Lines equalization, liner predictive vocoders.

Digital Modulation techniques

Digital Modulation formats, coherent binary modulation techniques, coherent quadrature modulation techniques, Noncoherent binary modulation techniques ,Comparison of binary and quaternary modulation techniques, M - ary modulation, Power spectra, Bandwidth efficiency, Applications of digital modulation techniques.

Spread spectrum modulation

Pseudo - noise sequences, Baseband spread spectrum system, DS - BPSK, processing gain, Probability of error, Jamming Margin, Frequency - Hop spread spectrum, Applications.

BOOKS**Text Books:**

1. Simon Haykin, Digital communication John Wiley and sons [Topics 3,4,5,6,7]
2. Taub and Schilling - Principles of communication systems - Tata McGraw Hill, second edition

Additional Reading:

1. John G. Proakis, Digital Communications, McGraw Hill
2. Bernad Shlar, Digital Communication, Pearson Education
3. K Sam Shanmugam - Digital and Analog Communication systems, John Wiley and sons.
4. Lathi B.P., Modern Digital and Analog communications systems - PRISM Indian edition

TERM WORK

1. Term work shall consist of at least eight practicals and assignments covering the topics of the syllabus.
2. A term work test shall be conducted with a weightage of 10 marks.

ORAL EXAMINATION

An oral examination is to be conducted based on the above syllabus.