**DIGITAL COMMUNICATION**

**Paper Code: ETEC-303 L T/P C**

**Paper: Digital Communication 3 1 4**

**INSTRUCTIONS TO PAPER SETTERS: MAXIMUM MARKS: 75**

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.

2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

*Objective: To enable the students*

1. *To distinguish between analog and digital communication.*
2. *To understand the concept of digital communication system.*
3. *To understand the concept of random variables and random process.*
4. *To learn the digital modulation techniques.*

**UNIT- I**  **Introduction to Digital Communication:**

**Line coding:** NRZ, RZ, Manchester encoding, differential Manchester encoding, AMI coding, high density bipolar code, binary with n-zero substitution codes,

Review of Sampling theorem, uniform and non-uniform quantization, companding, μ-Law and A-Law compressors, Concept and Analysis of PCM, DPCM, DM and ADM modulators and demodulators, M-ary waveforms, S/N ratio for all modulation, probability of error for PCM in AWGN Channel and other modulation techniques, Duo Binary pulse.

**[T1, R2][No. of Hours: 11]**

**UNIT- II** **Random Signal Theory:**

Probability, Concept of Random variable (Stationary, Non stationary, WSS, SSS), Random process, CDF, PDF, Joint CDF, Joint PDF, marginal PDF, Mean, Moments, Central Moment Auto-correlation & Cross-correlation, covariance functions, ergodicity, power spectral density, Gaussian distribution, Uniform distribution, Rayleigh distribution, Binomial distribution, Poission distribution, Weiner distribution, Wiener-Khinchin theorem, Central limit theorem.

**[T1, T2, R2] [No. of Hours: 11]**

**UNIT- III** **Designing of Receiver:**

Analysis of digital receiver, Prediction Filter, Design and Property of Matched filter, Correlator Receiver, Orthogonal Signal, Gram-Schmidt Orthogonalization Procedure, Maximum likelihood receiver, Coherent receiver design, Inter Symbol Interference, Eye Pattern.

 **[T1, T2, R1, R2] [No. of Hours: 11]**

**UNIT- IV Digital modulation schemes:**

Coherent Binary Schemes: ASK, FSK, PSK, QPSK, MSK, G-MSK. Coherent M-ary Schemes, Incoherent Schemes (DPSK and DEPSK), Calculation of average probability of error for different modulation schemes, Power spectra of digitally modulated signals, Performance comparison of different digital modulation schemes.Review of 2 Latest Research Paper.

**[T1, T2, R2][No. of Hours: 11]**

**Text Books:**

[T1] Simon Haykin, “Communication Systems” John Wiley & Sons, Inc 4th Edition.

[T2] Taub Schilling, “Principles of Communication Systems” TMH, 2nd Edition

**Reference Books:**

[R1] George Kennedy, “Communication System” TMH – 4th Edition

[R2] B. P. Lathi, “Modern Digital and Analog Communication System” Oxford University Press – 3rd Edition.

[R3] Digital Communications by John G.Proakis; McGraw Hill.