

2/4 B.Tech. FOURTH SEMESTER

EM4T3

PRINCIPLES OF COMMUNICATIONS

Credits: 4

Lecture: 4 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Course objectives:

- To understand the basics of analog and digital communication systems-Variou Modulation and Demodulation Techniques.
- Become familiar with the fundamentals of channel coding.

Learning Outcomes:

- The Students will be able to know the constituents of an Analog and digital communications systems and exhibit the theoretical knowledge in various modulation and demodulation systems.
- The student will know how to analyze and allocate performance objectives to components of an Analog and digital communications system.
- The student will understand basic channel coding techniques and Error control coding-Block codes,Convolutional codes

UNIT-I

Amplitude Modulation :

Amplitude modulation: Block diagram of Electrical communication system, Radio Communication, Need for modulation, Types of Amplitude modulation, AM, DSB SC, SSB SC,VSB, Power and BW requirements, Generation of AM, DSB SC, SSB SC, Demodulation of AM : Diode detector, Product demodulation for DSB SC & SSB SC.

UNIT II

Angle Modulation: Frequency & Phase modulations, advantages of FM over AM, Bandwidth consideration, Narrow band and Wide band FM, Comparison of FM & PM, FM modulators and FM demodulators, Armstrong method of generation, necessity of preemphasis and de-emphasis .

UNIT III

Pulse Modulations : Sampling, Nyquist rate of sampling, Sampling theorem for Band limited signals, PAM, regeneration of base band signal, PWM and PPM, Time Divison Multiplexing, Frequency Divison Multiplexing, Asynchronous Multiplexing.

UNIT IV

Digital Communication: Advantages, Block diagram of PCM, Quantization, effect of quantization, quantization error, Base band digital signal, DM, ADM, ADPCM and comparison.

UNIT V

Digital Modulation: ASK, FSK, PSK, and DPSK, QPSK demodulation, coherent and incoherent reception, Comparison of binary and quaternary modulation schemes, M-ary modulation techniques.

UNIT VI

Information Theory : Discrete messages and information content-Entropy, Average Information, source coding-Huffman and Shannon coding, Shannon's theorem, channel capacity

UNIT VII

Coding

Block codes- coding and decoding, Convolutional coding, decoding convolutional code, turbo codes.

UNIT VIII

Spread Spectrum Modulation: Use of spread spectrum, direct sequence spread spectrum, spread spectrum and CDMA, ranging using DS spread spectrum, frequency hopping spread spectrum, Pseudo random sequences – generation and characteristics. RADAR Systems.

Learning resources

TEXT BOOKS:

1. Communication Systems Analog and Digital – R.P. Singh and SD Sapre, TMH, 2nd Edition, 2008.
2. Principles of Communications – H. Taub and D. Schilling, Goutham saha, TMH, Third edition, 2nd reprint, 2008.
3. Electronic & Communication Systems – Kennedy and Davis, TMH, 4th edition, 2004.

REFERENCE BOOKS:

1. Communication Systems – Simon Haykin, John Wiley, 3rd edition.
2. Digital and Analog Communication Systems – K Sam Shanmugam, WSE, 2006.
3. Modern Digital and Analog communication Systems – B.P Lathi, Oxford 3rd edition