

## **EOPC2008 PRINCIPLES OF COMMUNICATION SYSTEMS (3-0-0)**

### **Course Objectives**

- To build concepts on the operation of analog and digital communication systems.
- To build fundamental concepts so that students can design some basic communication systems on their own.
- To introduce concepts on applications of communication systems in the industry.
- To introduce concepts on applications of communication systems in research.

### **Module I (4 Hours)**

Spectral Analysis: Energy Signal, Power Signal, Fourier series, Fourier transform, Energy Spectral Density, Power spectral density, Convolution, Parseval's theorem, Auto and Cross correlations.

### **Module-II(8 Hours)**

Analog Modulation: Concept Of Modulation, Amplitude modulation: Double-Sideband Suppressed Carrier, Double-Sideband Full Carrier, Single Sideband and vestigial sideband modulation; Demodulation: Carrier Recovery in AM, coherent Demodulation, Envelope Detector, Square-Law Demodulator, spectrum of AM signal, Superheterodyne Receiver.

### **Module-3 (6 Hours)**

Frequency Modulation System: Phase and frequency modulation and their relationship, frequency deviation, spectrum of FM signal, BW of FM signal, the effect of modulation on BW, narrowband FM, Armstrong and parameter variation methods of FM generation.

### **Module-IV (6 Hours)**

Review of probability and random process. Gaussian and white noise characteristics, Noise in amplitude modulation systems, Noise in Frequency modulation systems. Pre-emphasis and Deemphasis, Threshold effect in angle modulation.

### **Module-V (6 Hours)**

Pulse modulation. Sampling process. Pulse Amplitude and Pulse code modulation (PCM), Differential pulse code modulation. Delta modulation, Noise considerations in PCM, Time Division multiplexing, Digital Multiplexers.

### **Course Outcomes**

After the completion of this course, students will be able to:

- CO1: Understand the importance of Fourier analysis to communication systems.
- CO2: Understand fundamental concepts of analog and digital communication systems.
- CO3: Describe various components of communication systems in the time domain and frequency domain.
- CO4: Investigate and compare the performance of different communication systems.
- CO5: Apply the knowledge to design some basic communication systems on their own.

### **Essential Reading**

- B.P. Lathi, Zhi Ding, Modern Analog and Digital communication Systems, Oxford , 4th Edition 2011
- Michael Moher, Simon Haykin, Communications Systems, Wiley , 5th Edition 2009
- Sanjay Sharma, Communication System, Katson books, 4th Edition, 2007

**Supplementary Reading**

- H. Taub, D. L Schilling, G. Saha, Principles of Communication System, Tata McGraw Hill, 3rd Edition 2008
- A. B. Carlson, Communication Systems, McGraw-Hill, 5th Edition 2017