Subject Code		:

IA Marks		: 25

No. of Lecture Hrs/Week		: 04

Exam Hours		: 03

Total no. of Lecture Hrs.		: 52

Exam Marks		: 100

PART - A

Unit - 1

Random Process: Random variables: Several random variables. Statistical averages: Function of Random variables, moments, Mean, Correlation and Covariance function: Principles of autocorrelation function, cross – correlation functions. Central limit theorem, Properties of Gaussian process.

7 Hours

Unit - 2

Amplitude Modulation: Introduction, AM: Time-Domain description, Frequency – Domain description. Generation of AM wave: square law modulator, switching modulator. Detection of AM waves: square law detector, envelop detector. Double side band suppressed carrier modulation (DSBSC): Time-Domain description, Frequency-Domain representation, Generation of DSBSC waves: balanced modulator, ring modulator. Coherent detection of DSBSC modulated waves. Costas loop.

7 Hours

Unit - 3

Single Side-Band Modulation (SSB): Quadrature carrier multiplexing, Hilbert transform, properties of Hilbert transform, Pre-envelope, Canonical representation of band pass signals, Single side-band modulation, Frequency-Domain description of SSB wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave, Time-Domain description. Phase discrimination method for generating an SSB modulated wave. Demodulation of SSB waves.

6 Hours

Unit - 4

Vestigial Side-Band Modulation (VSB): Frequency – Domain description, Generation of VSB modulated wave, Time - Domain description, Envelop detection of VSB wave plus carrier, Comparison of amplitude modulation techniques, Frequency translation, Frequency division multiplexing, Application: Radio broadcasting, AM radio.

6 Hours

PART - B

Unit - 5

Angle Modulation (FM)-I: Basic definitions, FM, narrow band FM, wide band FM, transmission bandwidth of FM waves, generation of FM waves: indirect FM and direct FM.

6 Hours

Unit - 6

Angle Modulation (FM)-II: Demodulation of FM waves, FM stereo multiplexing, Phase-locked loop, Nonlinear model of the phase – locked loop, Linear model of the phase – locked loop, Nonlinear effects in FM systems.

6 Hours

Unit - 7

Noise: Introduction, shot noise, thermal noise, white noise, Noise equivalent bandwidth, Narrow bandwidth, Noise Figure, Equivalent noise temperature, cascade connection of two-port networks.

6 Hours

Unit - 8

Noise in Continuous wave modulation systems: Introduction, Receiver model, Noise in DSB-SC receivers, Noise in SSB receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, FM threshold effect, Pre-emphasis and De-emphasis in FM,.

8 Hours

Text books:

1. **Communication Systems**, Simon Haykins, 3rd Edition, John Willey, 1996.
2. **An Introduction to Analog and Digital Communication**, Simon Haykins, John Wiley, 2003.

Reference books:

1. **Modern digital and analog Communication systems** B. P. Lathi, 3rd ed 2005 Oxford University press.

2. **Communication Systems**, Harold P.E, Stern Samy and A Mahmond, Pearson Edn, 2004.
3. **Communication Systems**: Singh and Sapre**:** Analog and digital TMH 2nd , Ed 2007.