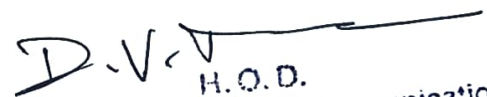


PRINCIPLES OF COMMUNICATION SYSTEMS [As per Choice Based Credit System (CBCS) scheme] SEMESTER – IV (EC/TC)			
Subject Code	15EC45	IA Marks	20
Number of Lecture Hours/Week	04	Exam Marks	80
Total Number of Lecture Hours	50(10 Hours per Module)	Exam Hours	03
CREDITS – 04			
Course objectives: This course will enable students to: <ul style="list-style-type: none"> • Design simple systems for generating and demodulating AM, DSB, SSB and VSB signals. • Understand the concepts in Angle modulation for the design of communication systems. • Design simple systems for generating and demodulating frequency modulated signals. • Learn the concepts of random process and various types of noise. • Evaluate the performance of the communication system in presence of noise. • Analyze pulse modulation and sampling techniques. 			
Modules			RBT Level
Module – 1			
AMPLITUDE MODULATION: Introduction, Amplitude Modulation: Time & Frequency – Domain description, Switching modulator, Envelop detector. DOUBLE SIDE BAND-SUPPRESSED CARRIER MODULATION: Time and Frequency – Domain description, Ring modulator, Coherent detection, Costas Receiver, Quadrature Carrier Multiplexing. SINGLE SIDE-BAND AND VESTIGIAL SIDEBAND METHODS OF MODULATION: SSB Modulation, VSB Modulation, Frequency Translation, Frequency- Division Multiplexing, Theme Example: VSB Transmission of Analog and Digital Television. (Chapter 3 of Text).			L1, L2, L3
Module – 2			
ANGLE MODULATION: Basic definitions, Frequency Modulation: Narrow Band FM, Wide Band FM, Transmission bandwidth of FM Signals, Generation of FM Signals, Demodulation of FM Signals, FM Stereo Multiplexing, Phase-Locked Loop: Nonlinear model of PLL, Linear model of PLL, Nonlinear Effects in FM Systems. The Superheterodyne Receiver (refer Chapter 4 of Text).			L1, L2, L3
Module – 3			

<p>RANDOM VARIABLES & PROCESS: Introduction, Probability, Conditional Probability, Random variables, Several Random Variables. Statistical Averages: Function of a random variable, Moments, Random Processes, Mean, Correlation and Covariance function: Properties of autocorrelation function, Cross-correlation functions (refer Chapter 5 of Text).</p> <p>NOISE: Shot Noise, Thermal noise, White Noise, Noise Equivalent Bandwidth (refer Chapter 5 of Text), Noise Figure (refer Section 6.7 of Text).</p>	L1, L2, L3
Module – 4	
<p>NOISE IN ANALOG MODULATION: Introduction, Receiver Model, Noise in DSB-SC receivers, Noise in AM receivers, Threshold effect, Noise in FM receivers, Capture effect, FM threshold effect, FM threshold reduction, Pre-emphasis and De-emphasis in FM (refer Chapter 6 of Text).</p>	L1, L2, L3
Module – 5	
<p>DIGITAL REPRESENTATION OF ANALOG SIGNALS: Introduction, Why Digitize Analog Sources?, The Sampling process, Pulse Amplitude Modulation, Time Division Multiplexing, Pulse-Position Modulation, Generation of PPM Waves, Detection of PPM Waves, The Quantization Process, Quantization Noise, Pulse-Code Modulation: Sampling, Quantization, Encoding, Regeneration, Decoding, Filtering, Multiplexing (refer Chapter 7 of Text), Application to Vocoder (refer Section 6.8 of Reference Book 1).</p>	L1, L2, L3
<p>Course Outcomes: At the end of the course, students will be able to:</p> <ul style="list-style-type: none"> • Determine the performance of analog modulation schemes in time and frequency domains. • Determine the performance of systems for generation and detection of modulated analog signals. • Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms. • Characterize the influence of channel on analog modulated signals • Determine the performance of analog communication systems. • Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems. 	
<p>Question paper pattern:</p> <ul style="list-style-type: none"> • The question paper will have ten questions. • Each full Question consisting of 16 marks. • There will be 2 full questions (with a maximum of Three sub questions) from each module. • Each full question will have sub questions covering all the topics under a module. • The students will have to answer 5 full questions, selecting one full question from each module. 	
<p>Text Book:</p> <p>Communication Systems, Simon Haykins & Moher, 5th Edition, John Wiley, India Pvt. Ltd, 2010, ISBN 978 – 81 – 265 – 2151 – 7.</p>	
Reference Books:	

1. **Modern Digital and Analog Communication Systems**, B. P. Lathi, Oxford University Press., 4th edition.
2. **An Introduction to Analog and Digital Communication**, Simon Haykins, John Wiley India Pvt. Ltd., 2008, ISBN 978-81-265-3653-5.
3. **Principles of Communication Systems**, H.Taub & D.L.Schilling, TMH, 2011.
4. **Communication Systems**, Harold P.E, Stern Samy and A.Mahmond, Pearson Edition, 2004.
5. **Communication Systems: Analog and Digital**, R.P.Singh and S.Sapre: TMH 2nd edition, 2007.


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