COMMUNICATION THEORY

Course Code	20EC3402	Year	II	Semester	II
Course Category	Program Core	Branch	ECE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Explain different concepts of analog and pulse modulation techniques (L2).
CO2	Apply various transform techniques for frequency domain analysis of analog baseband and passband signals
CO3	Develop AM and FM systems suitable for community(L3)
CO4	Analyze the noise performance of analog modulation techniques (L4)

Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)
Note: 1- Weak correlation   2-Medium correlation   3-Strong correlation
   * - Average value indicates course correlation strength with mapped PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2													
CO2	3								2	2		2	3	
CO3	3								2	2		2	3	
CO4		3							3	3		3	3	
Average* (Rounded to nearest integer)	3	3							2	2		2	3	

Syllabus		
Unit No.	Contents	Mapped CO
I	**Amplitude Modulation**-AM, DSB-SC, SSB, VSB - Modulation index, Spectra, Power relations and Bandwidth ,AM Generation – Square law and Switching modulator, Envelope Detection of AM waves, DSBSC Generation – Balanced and Ring Modulator, Coherent detection of DSB-SC Modulated waves: COSTAS Loop, Quadrature carrier multiplexing Generation of SSB waves, Generation of VSB waves, comparison of different AM techniques, Super heterodyne Receiver	CO1-CO4
II	**Angle Modulation** : Basic concepts of Phase and Frequency Modulation, Frequency modulation, Narrow band FM, Wide band FM, Generation of FM waves: Indirect FM, Direct FM, Demodulation of FM waves: Balanced Frequency discriminator, Phase locked loop (First Order). FM Radio Broadcasting ,FM Stereo Multiplexing	CO1-CO4

III	**Random Processes** : Random variables, Random Process, Stationary Processes, Mean, Correlation and Covariance functions, Ergodic Process, Transmission of a Random Process Through a LTI filter, Power Spectral Density, Gaussian Process,	CO1,CO4
IV	**Noise in Analog modulation** : AM Receiver model, , Signal to Noise Ratios for Coherent Reception, Noise in DSB Receiver, Noise in SSB Receivers, Noise in AM receivers using Envelope Detection ,Threshold Effect, FM Receiver model, Noise in FM receiver, FM Threshold effect, Pre-emphasis and De-emphasis in FM.	CO1,CO3, CO4
V	**Digital Representation of Analog Signals** : Low pass sampling , Aliasing, Signal Reconstruction, Uniform & non-uniform quantization, quantization noise , Logarithmic Companding ,PAM, PPM, PWM, TDM, FDM	CO1,CO3

Learning Resources
Text Books
1. Simon Haykin, "Communication Systems", 4th Edition, Wiley, 2014.
2. John G. Proakis, M.Salehi, "Fundamentals of Communication Systems", Pearson, 2nd Ed., 2013
Reference Books
1. Principles of Communication Systems – H Taub & D. Schilling, Gautam Sahe,TMH, 3rd Ed.,2007   **2.** Analog and Digital Communication System-Sam Shanmugam, John Wiley and Sons,3rd Edition,2009
e- Resources & other digital material
1. https://freevideolectures.com/course/2590/introduction-to-communication-theory   2.https://nptel.ac.in/courses/108/105/108105159/   3. https://cosmolearning.org/courses/introduction-to-communication-theory-452/video-lectures   4. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-450-principles-of-digital-communications-i-fall-2006/video-lectures/lecture-1-introduction/