Course Code	21ECC302T	Course Name	ANALOG AND DIGITAL COMMUNICATION	Course Category	C	PROFESSIONAL CORE	L	T	P	C
							3	0	0	3

Pre-requisite Courses	21MAB203T	Co- requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	ECE	Data Book / Codes / Standards		Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1:	introduce to the learners the basic concepts involved in Communication system
CLR-2:	comprehend the functionalities of various radio transmitters and receivers
CLR-3:	realize the process involved in digital communication systems
CLR-4:	explore the pass band transmission system and analyze its performance in terms of probability of error
CLR-5:	get exposed to Information theory and channel coding concepts

Course Outcomes (CO):	At the end of this course, learners will be able to:	Program Outcomes (PO)												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12			
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
CO-1:	explain the various analog modulation techniques	3	-	-	-	-	-	-	-	-	-	-	2	2	-	-
CO-2:	analyze the noise performance of radio transmitters and receivers	3	3	-	-	-	-	-	-	-	-	-	2	-	3	-
CO-3:	demonstrate the demodulation and detection of received digital data	3	2	-	-	-	-	-	-	-	-	-	-	-	-	3
CO-4:	apply the suitable passband techniques for real time applications	3	-	-	-	3	-	-	-	-	-	-	-	-	-	2
CO-5:	exposed to the concepts of information theory and channel capacity	3	-	3	-	-	-	-	-	-	-	-	-	3	-	-

Unit-1 - Analog Modulation Techniques — **9 Hour**

Need for Modulation - Types of Analog Modulation - Amplitude Modulation (AM) and its types - Generation of AM Waves - Linear Method (Collector Modulator) - Non Linear Method (Balanced Modulator) - Demodulation of AM waves (Envelop Detector) - Frequency Modulation (FM) – Types of FM –Narrow Band FM (NBFM) and Wide Band FM (WBFM) - Generation of NBFM (Varactor Diode Modulator) - Demodulation of NBFM waves (Foster Seely Method)- Phase Modulation (PM)- Generation of PM from FM and FM to PM

Unit-2 - Radio Transmitters and Receivers — **9 Hour**

AM Transmitter (Low Level and High Level) - FM Transmitter (Direct and Indirect Method) - Characteristics and functions of a receiver - AM Superheterodyne Receiver and FM Super Heterodyne Receiver - Noise in AM and FM (Elementary Treatment) - Need for Pre-emphasis and De-emphasis circuits

Unit-3 - Baseband and Digital Modulation Techniques — **9Hour**

Baseband Modulation Techniques (PAM, PWM and PPM) - Digital Modulation Techniques - Pulse Code Modulation (PCM) System) - Differential PCM (DPCM) System - Delta Modulation (DM) System - Matched Filter Receiver - Probability of error for Matched filter - Inter Symbol Interference (ISI) and Eye pattern

Unit-4 - Passband Transmission System — **9 Hour**

Passband Transmission System Model – Passband Modulation Techniques- Generation, Signal Space diagram, Detection, Probability of Error for BFSK - BPSK – QPSK – M-ary PSK and FSK (Elementary Treatment) – QAM System

Unit-5 - Information Theory and Channel Capacity — **9 Hour**

Entropy, Information rate, Source coding theorem, Shannon-Fano coding, Huffman coding, Mutual information – Shannon's channel capacity theorem

Learning Resources	1. Simon Haykin and Michael Moher, Communication Systems," 5th edition, John Wiley & Sons, 2013 2. Singh. R. P & Sapre. S. D, "Communication Systems: Analog & Digital," 3rd edition, Mc GrawHill Education, Seventh Reprint, 2016. 3. Simon Haykin, "Communication Systems", John Wiley & Sons, 4th Edition, 2008	4. Bernard Sklar, "Digital Communication, Fundamentals and Application", Pearson Education Asia, 2nd Edition, 2001 5. Taub & Schilling, "Principle of Communication Systems", McGraw Hill Inc, 2nd Edition, 2003. 6. John G. Proakis, "Digital Communication", McGraw Hill Inc, 5th Edition, 2008.

Learning Assessment

	Bloom's Level of Thinking	Continuous Learning Assessment (CLA)				Summative Final Examination (40% weightage)	
		Formative CLA-1 Average of unit test (50%)		Life-Long Learning CLA-2 (10%)			
		Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	25%	-	15%	-	15%	-
Level 2	Understand	25%	-	20%	-	25%	-
Level 3	Apply	30%	-	25%	-	30%	-
Level 4	Analyze	20%	-	25%	-	30%	-
Level 5	Evaluate	-	-	10%	-	-	-
Level 6	Create	-	-	5%	-	-	-
	Total	100 %		100 %		100 %	

Course Designers

Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
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