Institute:	Institute of Technology
Name of Programme:	B.Tech. Electronics & Communication Engineering
Course Code:	2EC301
Course Title:	Communication Systems
Course Type:	(■ Core/ ☐ Value Added Course/☐ Departmental Elective/ ☐ Institute Elective/ ☐ University Elective/ (☐ Open Elective Any other)
Year of Introduction:	2023-24

Credit Scheme

L	T	Practical component				C
		LPW	PW	W	S	
2	-	2	-	-	-	3

Course Learning Outcomes (CLOs):

At the end of the course, students will be able to-

1. explore analog and angle modulation techniques, their comparison and applications. BL 2
2. compare pulse modulation techniques and select an appropriate one for attaining the desired goal of communication. BL 2
3. analyse baseband pulse transmission techniques for achieving communication in the presence of channel impairments. BL 4
4. evaluate the performance of communications systems BL 5

Unit No.	Syllabus	Teaching hours
I	**Overview of Random Processes:** Fourier Transform and its properties, Mathematical Definition of a Random Process, Stationary Processes, Mean, Correlation, and Covariance Functions, Ergodic Processes, Transmission of a Random Process Through a Linear Time Invariant Filter, Power Spectral Density and Autocorrelation function, Gaussian Process, Noise, Stochastic Analysis of Noise.	**03**
II	**Continuous Wave Modulation:** Amplitude Modulation Schemes, Frequency Translation, Frequency-Division Multiplexing, Angle Modulation Schemes, Superheterodyne Receiver, Noise in AM, FM and PM Modulation Systems, Noise in FM Receivers.	**12**
III	**Pulse Modulation:** Sampling Process, Quantisation Process, Pulse-Code Modulation, Noise Considerations in PCM Systems, Time-Division Multiplexing, Digital Multiplexers, Delta Modulation, Differential Pulse-Code Modulation, Sigma-Delta Modulation	**08**
IV	**Baseband Pulse Transmission:** Matched Filter, Error Rate Due to Noise, Inter-symbol Interference, Nyquist's Criterion for Distortion less Baseband Binary Transmission, Correlative-Level Coding, Adaptive Equalisation	**07**

Self Study:
The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:
Laboratory work will be based on above syllabus with minimum 10 experiments to be incorporated.

List of Experiments:

Sr. No.	Title of the experiment	Hours
1	Apply the concepts of Amplitude Modulation (AM) and demodulation scheme to perform on the kit.	02
2	Apply the concepts of DSB-SC modulation and demodulation scheme to perform on the kit.	02
3	Apply the concepts of SSB-SC modulation and demodulation scheme to perform on the kit.	02
4	Apply the concepts of Frequency Modulation (FM) and demodulation scheme to perform on the kit.	02
5	Analyse the analog modulation schemes on MATLAB software.	02
6	Analyse the operation of the mixer used in the super heterodyne receiver by implementing it on the AM/FM receiver kit.	02
7	Apply the concepts of sampling in Pulse Amplitude Modulation (PAM) and demodulation.	02
8	Apply the concepts of Pulse Width modulation (PWM) and demodulation scheme to perform on the kit.	02
9	Apply the concepts of Pulse Position modulation (PPM) and demodulation scheme to perform on the kit.	02
10	Implement synchronisation in the Time Division Multiplexing (TDM) system.	04
11	Apply the concepts of Pulse Position modulation (PCM) and demodulation scheme to perform on the kit.	02
12	Analyse line coding techniques.	02
13	Apply the concepts of Delta Modulation (DM) and demodulation scheme to perform on the kit.	02
14	Use adaptive schemes in Adaptive Delta Modulation (ADM) and demodulation to overcome the limitations of delta modulation.	02
15	Apply the concepts of Sigma-Delta (∑-Δ) modulation and demodulation scheme to perform on kit.	02

Suggested Readings:.

1. Simon Haykin, Communication Systems, John Wiley
2. B P Lathi, Modern Analog and Digital Communication Systems, Oxford
3. Roddy and Coolen, Electronic Communication, PHI
4. Taub and Schilling, Principles of Communication Systems, Tata McGraw Hill
5. M F Mesiya, Contemporary Communication Systems, McGraw Hill