SEMESTER S5

ANALOG AND DIGITAL COMMUNICATION

Course Code	PCECT502	CIE Marks	40
Teaching Hours/Week (L: T:P: R)	3-1-0-0	ESE Marks	60
Credits	4	Exam Hours	2Hrs. 30 Min.
Prerequisites (if any)	PCECT402 Signals and Systems GBMAT401 Probability, Random Process and Numerical Methods	Course Type	Theory

Course Objectives:

1. To analyse different analog and digital communication systems

SYLLABUS

Module No.	Syllabus Description	Contact Hours
1	Block diagram of a communication system. Need for modulation. Amplitude modulation, Equation and spectrum of AM signal, DSB-SC, SSB -pilot carrier and Vestigial sideband systems. Angle modulation: Narrow and wide band FM and their spectra, relationship between FM and PM, Carson's rule, pre-emphasis and de-emphasis filtering. Comparison of AM and FM, Block diagram of FM receiver. Superheterodyne receivers- Characteristics of receivers –image frequency. Noise: external, internal, White noise.	12
2	Sampling and Quantization, SQNR for uniform quantization, Companding Pulse code modulation, Transmitter and receiver. DPCM transmitter and receiver. Delta modulation, Slope overload, Line codes.	10
3	Baseband data transmission of digital data through AWGN channel, Mathematical model of ISI, Nyquist criterion for zero ISI, Signal modelling for ISI, Raised cosine spectrum, Equalization,Zero forcing Equaliser. Geometric representation of Signals-Gram-Schmitt procedure, Signal space. Vector model of AWGN channel. Matched filter and correlation receivers, MAP receiver, Maximum likelihood	12

	receiver.	
4	Digital band pass modulation schemes-BPSK system and signal constellation. BPSK transmitter and receiver. QPSK system and Signal constellations. BER analysis of BPSK and QPSK in erfc. Plots of BER Vs SNR. QPSK transmitter and receiver. Quadrature amplitude modulation and signal constellation.	**10**

Course Assessment Method

(CIE: 40 marks, ESE: 60 marks)

Continuous Internal Evaluation Marks (CIE):

Attendance	Assignment/ Microproject	Internal Examination-1 (Written)	Internal Examination- 2 (Written)	Total
5	**15**	**10**	**10**	**40**

End Semester Examination Marks (ESE)

In Part A, all questions need to be answered and in Part B, each student can choose any one full question out of two questions

Part A	Part B	Total
● 2 Questions from each module. ● Total of 8 Questions, each carrying 3 marks **(8x3 =24 marks)**	● Each question carries 9 marks. ● Two questions will be given from each module, out of which 1 question should be answered. ● Each question can have a maximum of 3 sub divisions. **(4x9 = 36 marks)**	**60**

Course Outcomes (COs)

At the end of the course students should be able to:

Course Outcome		Bloom's Knowledge Level (KL)
CO1	Illustrate the principles of analog communication systems	**K2**
CO2	Explain the basic concepts of digital communication	**K2**
CO3	Analyse the baseband transmission of digital data through AWGN channel	**K3**
CO4	Apply various digital modulation techniques in the design of digital communication systems	**K3**

Note*: K1- Remember, K2- Understand, K3- Apply, K4- Analyse, K5- Evaluate, K6- Create*

CO-PO Mapping Table:

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	2	-	-	-	-	-	-	-
CO2	3	-	-	-	2	-	-	-	-	-	-	-
CO3	3	3	3	3	2	-	-	-	-	-	-	2
CO4	3	3	3	3	2	-	-	-	-	-	-	2

Text Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Communication Systems	Simon Haykin and Michael Moher	Wiley	5th Edition, 2020
2	Modern Digital and Analog Communication Systems	B.P. Lathi and Zhi Ding	Oxford University Press	5th Edition, 2018
3	Introduction to Analog and Digital Communication, An Indian adaptation	Simon Haykin and Michael Moher	Wiley	2nd Edition, 2022

Reference Books				
Sl. No	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Principles of Communication Systems	Herbert Taub and Donald L. Schilling	McGraw-Hill Education	4th Edition, 2013
2	Digital Communications	John G. Proakis and Masoud Salehi	McGraw-Hill Education	6th Edition, 2020
3	Communication Systems Engineering	John G. Proakis and Masoud Salehi	Pearson	2nd Edition, 2001
4	Digital Communications Systems, An Indian Adaptation	Simon Haykin	John Wiley& Sons	4th Edition, 2021
5	Electronic communication systems	George Kennedy	McGraw Hill	6th Edition, 2017
6	Introduction to Digital Communications	Wayne Stark	Cambridge University Press	1st edition 2023

Video Links (NPTEL, SWAYAM…)	
Module No.	**Link ID**
1	https://youtu.be/hTAlcrqjNps?si=okoRHdUegx9pbOz3
2	https://youtu.be/s_vmLqT_6NQ?si=MF2OW6AaICiYKTfj