BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI,
HYDERABAD CAMPUS
SECOND SEMESTER 2022-23
COURSE HANDOUT (PART-II)

Date: 16-01-2023

In addition to Part I (General Handout for all the courses appended to the time table), this portion gives further specific details regarding the course.

Course No.	**EEE F416**
Course Title	**Digital Communications**
Instructor-in-charge	**Gopal Krishna Kamath M**
Course Description	This course covers the topics on digital communications and basics of information theory. Theoretical explanation of various source and channel coding algorithms and transmission of information through channels along with different modulation mechanisms are also included.
Scope and Objective	The objective of the course is to impart knowledge of the basic tools for the design of digital communication system and to provide methods and procedures suitable for a variety of modulation techniques to transmit information over channels. The course also provides basic understanding of information theory and wireless communications including emerging trends in these fields.

Text Books:
T1: John G. Proakis, and M.Salehi, "Digital Communications," 5th Edition, McGraw Hill.
T2: Ranjan Bose, "Information Theory, Coding and Cryptography," 3rd Edition, McGraw Hill.
T3: B. Sklar and P. K. Ray, "Digital Communications: Fundamentals and Applications," 2nd Edition, Pearson.

Reference Books:
R1:Robert G. Gallager, "Principles of Digital Communication," Cambridge University Press.
R2: David Tse, and PramodViswanath, "Fundamentals of Wireless Communication," Cambridge University Press.
R3: B. P. Lathi, "Modern Digital and Analog Communications Systems," 3rd Edition, Oxford University Press.
R4: Simon Haykin, "Digital Communication Systems," Wiley.
R5: I. Glover and P. Grant, "Digital Communications," 3rd Edition, Pearson.

Course Plan

Lect. No.	Learning Objectives	Topics to be covered	Chapter in the Text Book
1	Introduction and modelling and characterization of information sources	Introduction to digital communication and information theory. Mathematical models for information sources, logarithmic measure of information, concept of entropy	**T1**:6.1 to 6.3 **T2**:1.1 to 1.3 **T3**: 13
2-3	Algorithms for source coding and analog output sources	Huffman coding, Shannon-Fano-Elias Coding, Arithmetic Coding, Lempel-Ziv Algorithm, Run-length coding	**T1**: 6.3-2 **T2**: 1.6 to 1.10 **T3**: 13
4-18	Information transmission through AWGN channels using digital modulation methods and BER estimation;	Pulse Amplitude Modulation, Digital Phase Modulation: PSK, BPSK, QPSK, OQPSK, DPSK, Quadrature Amplitude Modulation, Frequency Shift Keying: Modulation and Demodulation Schemes.	**T1**: 3 **T3**: 4
19-29	Digital communication through band limited Gaussian noise channels	Characterization of band-limited channels, Signal design, ISI and Nyquist Criterion, Optimum Receiver, Linear Equalization, Adaptive Equalization	**T1**:9 **T1**:10 **T3**: 16
30-31	Channel coding and decoding	Error Correcting Codes, Linear Block Codes, Parity Check Code, Hamming Code, Cyclic Code	**T1**: 7 **T2**: 3, 4 **T3**: 6
32-35	Wireless communication channels: its characterization and modulation schemes for such channels	Characterization of fading multipath channels, Statistical Models, Linear Modulation Schemes, Constant Envelope Modulations, Combined linear and constant envelope modulation schemes, Modulation performance.	**T1**: 13 **T3**: 15
36-40	Emerging trends	MIMO Systems: Analysis	**T1**: 15

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Assignment(s)/ Seminar(s)/Quiz(s) (3 Nos.)	-	30%	To be announced	Open Book
Mid Semester Examination	90 Minutes	30%	14/03 11.30 - 1.00PM	Closed Book
Comprehensive Exam	180 minutes	40%	10/05 AN	Closed Book
Total		100%		

Chamber Consultation Hours: To be announced in class.
Notices: All notices will be uploaded in CMS for the respective course.
Make-up Policy: Make-up for the Mid-Semester and End-Semester examinations will be provided subject to prior approval taken from the IC.
Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

Gopal Krishna Kamath M
(INSTRUCTOR-IN-CHARGE)