



Kot Bhalwal, Jammu



Model Institute of Engineering
& Technology (Autonomous)
Course Handout

COURSE HANDOUT

ANALOG AND DIGITAL COMMUNICATION (ECE-402)

ECE-4TH SEMESTER

ACADEMIC YEAR (2024-25)

Dr. Umar Farooq

Assistant Professor

Department of Electronics and Communication Engineering



Department of Electronics and Communication Engineering

Model Institute of Engineering & Technology (Autonomous)

Kot Bhalwal, Jammu - 181122

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Dr. Arun K. Gupta Teaching-Learning Centre

Version 1.1



Please Do Not Print Unless Necessary



Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
ECE-402	Analog and Digital Communication	PCC	4	3	1	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1	Analyze the behavior of a communication system in presence of noise and compare different analog modulation schemes for their efficiency and bandwidth
CO2	Analyze various angle modulation and demodulation techniques including FM and PM.
CO3	Investigate pulsed modulation system and analyze their system performance
CO4	Analyze different digital modulation schemes and can compute the bit error performance
CO5	Perform mathematical analysis of problems in Information Theory and Coding

Section-A

Unit 1: Continuous Wave Modulation: The essentials of communication systems, Noise in communication system, Signal to noise ratio & noise figure, Concept & need for modulation, Types of modulation, Amplitude Modulation and Demodulation, Generation of DSBSC waves, Coherent detection of DSBSC waves, Single side band modulation and demodulation, vestigial sideband modulation (VSB)

(10Hrs)

Unit 2: Angle Modulation: Theory of FM, Representation & frequency spectrum of FM, Pre-Emphasis, De-Emphasis, Wide band & Narrow band FM, Generation & detection of FM signal, Comparison with PM & AM, Introduction to receivers, Super heterodyne receivers.

(8Hrs)

Unit 3: Pulse Modulation: Basic model of digital communication system, Sampling Process, Quantization Process, Pulse-Amplitude Modulation and Other forms of Pulse Modulation, Pulse-Code Modulation, Delta Modulation, Linear Prediction, Differential Pulse-Code Modulation and Adaptive Differential Pulse-Code Modulation, Time division multiplexing.

(8Hrs)

Section-B

Unit 4: Digital Modulation Techniques: Introduction to Digital Modulation Techniques, Types of digital modulation techniques, FSK, ASK, BPSK, DPSK, QPSK generation and reception, differentially encoded PSK (DEPSK), M-ray PSK, MSK, Comparison of digital modulation techniques.

(9Hrs)

Unit 5: Information Theory and Channel Coding: Information rate, Entropy, source coding & coding efficiency, Shannon Fanno coding, Huffman coding, channel capacity theorem, Block codes coding and decoding, Convolution coding and decoding, State & Trellis diagrams, Viterbi Algorithm.

(10Hrs)



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Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Principles of Communication Systems	Taub and Schilling	Tata McGraw Hill	3 rd (2009)
2.	Communication Signals and Systems	S. Haykins	Wiley-India	3 rd (2010)
3	Digital Communications: Fundamentals and Applications	Bernard Sklar	Prentice-Hall PTR	3 rd (2017)

Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Digital Communications	J.G. Proakis,	Prentice Hall	2 nd (2002)
2	Communication Systems: Analog & Digital	RP Singh, S D Sapre	Tata McGraw Hill	2 nd (2008)
4	Electronic Communication Systems	George Kennedy, Bernard Davis, S. R. M Prasanna	McGraw Hill	6 th (2017)





COURSE PLAN		
Unit-I Continuous Wave Modulation		
S.No	Topics	Recommended Books
1	The essentials of communication systems	Book 1, Ch.1
2	Noise in communication system	Book 1, Ch.7
3	Types of Noise	Book 1, Ch.7
4	Signal to noise ratio & noise figure	Book 1, Ch.7
5	Concept & need for modulation, Types of modulation	Book 2, Ch.3
6	Amplitude Modulation and Demodulation	Book 2, Ch.3
7	Generation of DSBSC waves	Book 2, Ch.3
8	Coherent detection of DSBSC waves	Book 2, Ch.3
9	Single side band modulation and demodulation	Book 2, Ch.3
10	Vestigial sideband modulation (VSB)	Book 2, Ch.3
Unit-II Angle Modulation		
11	Theory of FM, Representation & frequency spectrum of FM	Book 2, Ch.4
12	Pre-Emphasis, De-Emphasis	Book 2, Ch.4
13	Wide band & Narrow band FM	Book 2, Ch.4
14	Generation of FM signal	Book 2, Ch.4
15	Detection of FM signal	Book 2, Ch.4
16	Phase modulation, Comparison with FM & AM	Book 2, Ch.4
17	Introduction to receivers	Book 1, Ch.2
18	Super heterodyne receivers	Book 1, Ch.2
Unit-III Pulse Modulation		
19	Basic model of digital communication system	Book 1, Ch.2
20	Sampling and Quantization Process	Book 1, Ch.2
21	Pulse-Amplitude Modulation	Book 1, Ch.1
22	Other forms of Pulse Modulation	Book 2, Ch.2
23	Pulse-Code Modulation	Book 2, Ch.2
24	Delta Modulation	Book 2, Ch.2
25	Linear Prediction	Book 2, Ch.2
26	Differential Pulse-Code Modulation	Book 2, Ch.2
27	Adaptive Differential Pulse-Code Modulation	Book 2, Ch.2
28	Time division multiplexing	Book 2, Ch.2
29	Frequency division multiplexing	Book 2, Ch.2
Unit-IV Digital Modulation Techniques		



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30	Introduction to Digital Modulation Techniques, Types of of digital modulation techniques	Book 3, Ch.4
31	FSK generation and reception	Book 3, Ch.4
32	ASK generation and reception	Book 3, Ch.4
33	BPSK generation and reception	Book 3, Ch.4
34	DPSK generation and reception	Book 3, Ch.4
35	QPSK generation and reception	Book 3, Ch.4
36	Differentially encoded PSK (DEPSK)	Book 3, Ch.4
37	M-ray PSK	Book 3, Ch.4
38	MSK & Comparison of digital modulation techniques.	Book 3, Ch.4
Unit-V Information Theory and Channel Coding		
39	Information rate	Book 2, Ch.3
40	Entropy	Book 1, Ch.4
41	source coding & coding efficiency	Book 1, Ch.4
42	Shannon Fano coding	Book 2, Ch.3
43	Huffman coding	Book 1, Ch.3
44	channel capacity theorem	Book 2, Ch.3
45	Block codes coding and decoding	Book 1, Ch.3
46	Convolution coding and decoding	Book 1, Ch.3
47	State & Trellis diagrams.	Book 1, Ch.3
48	Viterbi Algorithm	Book 1, Ch.3



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ADDITIONAL WEB

1.	NPTEL: Video lectures on Analog Communication Lecture series by Prof. Gautam Das, IIT Kharagpur. https://nptel.ac.in/courses/117/105/117105143
2.	NPTEL: Video lectures on Introduction on Digital communication lecture series by Prof. Bikash Kumar, IIT Bombay. https://nptel.ac.in/courses/117/101/117101051/
3.	NPTEL: Video lectures on Introduction on Information theory and coding lecture series by Prof. S. N. Merchant, IIT Bombay. https://nptel.ac.in/courses/117/101/117101053/

GRADING AND ASSESSMENT

- **Sessional Test:** 20 marks
- **Assignment:** 20 marks
- **Attendance:** 10 marks
- **Final Examination:** 100 marks

COURSE POLICIES

- **Attendance:** Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity:** MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions:** Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**

Monday (12:05 PM - 12:55 PM)

Thursday (11:30 AM - 12:55 PM)

- **Contact Information**
umar.ece@mietjammu.in