

COURSE DATA SHEET

PROGRAM: Electronics and Communication Engineering	DEGREE: B.Tech (U .G)
COURSE: Analog Communication	SEMESTER: Even CREDITS: 3
COURSE CODE: EC401	COURSE TYPE: CORE /ELECTIVE /- BREADTH/ S&H
COURSE AREA/DOMAIN: Electronics Engineering	CONTACT HOURS: 3 hours/Week.
CORRESPONDING LAB COURSE CODE (IF ANY): EC491	LAB COURSE NAME (IF ANY): Analog Communication Laboratory

COURSE PRE-REQUISITES:

C.CODE	COURSE NAME	DESCRIPTION	SEM
M-302	Mathematics	Fourier Integral Theorem, Fourier Transform of a function, Properties of Fourier Transform: Linearity, Shifting, Change of scale, Modulation, Inverse of Fourier Transform, Random variables	III
EC-303	Signals and systems	Fourier transformation of continuous and discrete time signals and their properties	III



Course Syllabus

Module1

Introduction to Analog Communication:

9

Elements of communication system - Transmitters, Transmission channels & receivers [1]

Concept of modulation, its needs [1]

Continuous Wave Linear Modulation:

a) Amplitude modulation(AM-DSB/TC): Time domain representation of AM signal (expression derived using a single tone message), modulation index [1]

Frequency domain (spectral) representations, illustration of the carrier and side band components; transmission bandwidth for AM; Phasor diagram of an AM signal [2]

Calculation of Transmitted power & sideband power & Efficiency; concept of under, over and critical modulation of AM-DSB-TC. [2]

b) Other Amplitude Modulations: Double side band suppressed carrier (DSBSC) modulation: time and frequency domain expressions, bandwidth and transmission power for DSB. [1]

Single side band modulation (SSB) both TC& SC and only the basic concept of VSB, Spectra and band-width. [1]

Module 2

Generation & Detection of Amplitude Modulation: 9

a) Generation of AM: Concept of i) Gated and ii) Square law modulators, Balanced Modulator.[2]

b) Generation of SSB: Filter method, Phase shift method and the Third method [2]

Demodulation for Linear Modulation:

Demodulation of AM signals: Detection of AM by envelope detector [1]

Synchronous detection for AM-SC, Effects of Frequency & Phase mismatch, Corrections. [2]

Principle of Super heterodyne receivers: Super heterodyning principle, intermediate frequency, Local oscillator frequency, image frequency. [2]

Module 3

Angle Modulation: 8

a) Frequency Modulation (FM) and Phase Modulation (PM): Time and Frequency domain representations, Spectral representation of FM and PM for a single tone message, Bessel's functions and Fourier series. [2]

Phasor diagram [1]

b) **Generation of FM & PM:** Narrow and Wide-band angle modulation, Basic block diagram representation of generation of FM & PM, Concept of VCO & Reactance modulator [2]

c) **Demodulation of FM and PM:** Concept of frequency discriminators [1]

Phase Locked Loop [2]

Module 4

Multiplexing: 10

a) Frequency Division Multiplexing, Time Division Multiplexing, (FDM) [1]

b) Stereo – AM and FM: Basic concepts with block diagrams [2]

c) **Random Signals and Noise in Communication System:**

i) Noise in Communication systems – Internal & External noise, Noise Temperature, Signal-to-Noise ratio, White noise, thermal noise, Figure of Merit. [2]

ii) Noise performance in Analog Communication systems: SNR calculation for DSB/TC, DSB-SC, SSB-TC, SSBSC& FM. [5]

Textbooks:

1. Taub and Schilling, Principles of Communication Systems, 2nd ed., Mc-Graw Hill

2. B. P. Lathi, Communication Systems, BS Publications
3. V Chandra Sekar, Analog Communication, Oxford University Press

Reference Books:

1. Carlson, Communication System, 4/e , Mc-Graw Hill
2. Proakis & Salehi, Fundamentals of Communication Systems, Pearson
3. Singh & Sapre, Communication Systems: 2/e, TMH
4. P K Ghosh, Principles of Electrical Communications, University Press
5. L.W.Couch II, Digital and Analog Communication Systems, 2/e, Macmillan Publishing
6. Blake, Electronic Communication Systems, Cengage Learning
7. S Sharma, Analog Communication Systems, Katson Books

COURSE OBJECTIVES:

1	Familiarize students with basic concepts of modulation, demodulation and functions of major building blocks of communication system.
2	Familiarize students with time division and frequency division multiplexing techniques used in analog communication.
3	Different modulation techniques for amplitude and angle modulation will be taught with a clear understanding of the performance parameters of the systems.
4	Different demodulation techniques for amplitude and angle modulation will be taught with a clear understanding of the advantages and disadvantages of the systems.
5	Familiarize students with the construction and functions of different parts of super heterodyne radio receivers.

COURSE OUTCOMES:

S.NO	DESCRIPTION	Blooms Level	PO(1..12) MAPPING	PSO(1..2) MAPPING
CO1	Select appropriate amplitude modulation and demodulation techniques.	Apply	1, 12	1, 2
CO2	Select appropriate angle modulation and demodulation techniques.	Apply	1, 2, 3, 5, 12	1, 2
CO3	Model a superheterodyne receiver and stereo systems for AM and FM.	Apply	1, 2, 3, 5, 12	1, 2
CO4	Compare the performance of AM and FM systems in terms of SNR.	Evaluate	1, 2, 3, 6, 7, 8, 12	1, 2
CO5	Solve problems on statistical communication systems.	Apply	1, 2, 3, 12	1, 2

COURSE OVERALL PO/PSO MAPPING: PO1, PO2, PO3, PO5, PO6, PO7, PO8, PO12, PSO1, PSO2

COURSE OUTCOMES VS POS MAPPING (DETAILED; HIGH: 3; MEDIUM: 2; LOW: 1):

S.NO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	3											1	3	3
CO2	3	3	3		1							1	3	3
CO3	3	3	3		1							1	3	3
CO4	3	3	3			1	1	1				1	3	3
CO5	3	3	3									1	2	2
CO*	3	3	3		1	1	1	1				1	2.8	2.8

** For Entire Course, PO /PSO Mapping; 1 (Low); 2(Medium); 3(High) Contribution to PO/PSO*

PO1	Engineering Knowledge	PO7	Environment & Sustainability	PSO1	Students will acquire knowledge in Advance Communication Engineering, Signal and Image Processing, Embedded and VLSI System Design
PO2	Problem Analysis	PO8	Ethics	PSO2	Students will qualify in various competitive examinations for successful employment, higher studies and research
PO3	Design & Development	PO9	Individual & Team Work		
PO4	Investigations	PO10	Communication Skills		
PO5	Modern Tools	PO11	Project Management & Finance		
PO6	Engineer & Society	PO12	Life Long Learning		