MITE

Invent Solutions

COMMUNICATION SYSTEMS

23ECOE322

(COURSE HANDBOOK)

Open Elective course offered by Department of ECE

Course In-charge:

Mr. Dony Armstrong DSouza

1. GENERAL INFORMATION

Welcome to the course Communication Systems.

This course serves as an essential introduction to the principles of communications and is , tailored for students aiming to understand the conceptual knowledge of the process and methods of electronic communication and propagation methods to be employed in developing systems and which forms the basis for modern day broadcasting, communication, infotainment equipments and many more.

The curriculum is structured into five comprehensive modules, each designed to give insights upon the information/signals, processes and components. We will begin with the foundational concepts such as information systems, modulation, noise and disturbances due to component physicality and the environment, multiplexing and propagation methods.

As we progress through the course, you will be encouraged to actively participate in discussions and developments in the present day communication and methods and improvements which have led to effective reduced noise transmission and receiving of information. We aim to connect academic insights with real-world scenarios, to which they will have the basic understanding and roles in diverse domains.

We hope that this Course will not only equip you with theoretical knowledge but also inspire you to apply these insights practically in your projects, future and endeavors. Kindly familiarize yourself with this handbook as it contains vital information regarding assessments, learning outcomes, and resources that will support your academic journey. We look forward to have an enthusiastic learning and productive semester together!

1.1 Course Learning Objectives

1. **Knowledge of Communication System: -** Familiarize with concept and knowledge of elements of communication systems and different modulation techniques
2. **Familiarize Noise in Communication Systems:** Familiarize with the types of noise in Communication and their effects on signal quality
3. **Concept of Optical fiber propagation and wave propagation**:- Introduce the concepts of optical fiber communication systems and wave propagation effects

1.2 Course outcome

CO1: **Explain** the principles of analog, digital and optical fiber communication techniques

CO2: **Comprehend** the multiplexing and wave propagation techniques used in Communication systems

CO3: **Apply** the concepts of modulation techniques in communication systems to efficiently transmit information.

CO4: **Apply** the principles of noise in communication systems to identify SNR

1.3 Set Text and Suggested Sources

All the below mentioned books are available in the College Library.

Text Books:

1. Simon Haykin "Communication Systems", 5th Edition, Willey ,2017 2. Roy Blake, "
2. Roy Blake "Electronics Communication Systems",2nd Edition, Thomson Learning Inc, 2005
3. Dennis Roddy & Thon Coolen, "Electronic Communications", 4th Edition, PHI, 2006

Reference Books:

1. B.P. Lathi and Zhi Ding "Modem Digital and Analog Communication Systems", Oxford University Press,5th Edition, 2022
2. John G. Proakis& Masoud Salehi, "Digital Communications", McGraw-Hill, 5th Edition, 2008.

2. THE COURSE

2.1 Course Description

The **Communication Systems** course is offered as an open elective course in Semester VI of the B.E. program. The course spans **42 hours** over the semester and carries **3 credits**. Assessment consists of **Continuous Internal Evaluation (CIE) for 50 marks** and a **Semester End Examination (SEE) for 50 marks**. The course focuses on both traditional and modern consumer electronic systems, preparing students to understand, analyze, and adapt to rapidly evolving technologies in the electronics industry.

2.2 Initiating Contact with Staff and Other Students

Students are encouraged to maintain open communication with the course instructor for academic clarification and guidance. Queries should be addressed during class hours, office hours, or via official email communication. Collaborative learning through peer discussion is strongly encouraged to enhance conceptual understanding.

2.3 Resources

Learning resources extend beyond textbooks and include:

- NPTEL Portal:

  Principals of Communication-I: https://nntel.ac.in/courses/108104091

  Principles of Digital Communications: httns://nptel.ac.in/courses/108102120
- VTU Consortium digital library
- E-learning and digital library can be accessed via the college website https://mite.ac.in/ (Campus Life section > Library > VTU Consortium/e-learning platforms/additional sources).

These resources can be accessed through the institute library and official academic portals.

2.4 Staff In-charge

Mr. Dony Armstrong DSouza
Department of Electronics & Communication Engineering
Email: dony@mite.ac.in
Mobile: 9964073013

2.5 Topics and Reading materials for each module

Module 1 *No. of Hours: 09*

➢ **Topic: Analog Communication**

- Elements of Communication System,
- Amplitude Modulation: time & frequency domain,
- Modulation index, Frequency modulation,
- Frequency deviation, Phase
- Modulation, relation between frequency and phase modulation

-Essential Readings:

o Roy Blake, " Electronics Communication Systems", 2nd Edition, Thomson Learning Inc, 2005 Chapter 1- Section 1.1,1.2
Chapter 3- Section 3.1, 3.2, 3.3
Chapter 4- Section 4.2,4.3

-Additional Reading:

- Simon Haykin "Communication Systems", 5th Edition, Willey ,2017.
- Web links: Principals of Communication:- https://nntel.ac.in/courses/108104091

Module 2 *No. of Hours: 08*

➢ **Topic: Noise in Communication**

- Introduction to noises: Thermal noise, Shot noise, Low frequency noise, Avalanche noise,
- BJT, FET noise, Signal to Noise ratio, Noise factor,
- Measurement of noise temperature and noise factor, Narrow Band-pass noise

-Essential Readings:

o Dennis Roddy & Thon Coolen, " Electronic Communications", 4th Edition, PHI, 2006 Chapter 4- Section 4.1 -4.3,4.5, 4.7 - 4.9, 4.11, 4.13, 4.19, 4.20

-Additional Reading:

- Simon Haykin "Communication Systems", 5th Edition, Willey ,2017.
- Web links: Principals of Communication:- https://nntel.ac.in/courses/108104091

Module-3 *No. of Hours: 08*

- **Topic: Digital Communication**
  - Introduction, Sampling Theorem,
  - Pulse Modulation, Pulse Code Modulation: coding & decoding,
  - Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying

-Essential Readings:

o Roy Blake, " Electronics Communication Systems", 2nd Edition, Thomson Learning Inc, 2005 Chapter 7- Section 7.1 - 7.3,
Chapter 12: Section- 12.2, 12.3

-Additional Reading:

o Simon Haykin "Communication Systems", 5th Edition, Willey ,2017.

o Web links: Principals of Communication:- https://nntel.ac.in/courses/108104091

- Principles of Digital Communications : https://nptel.ac.in/courses/108102120

Module 4 *No. of Hours: 09*

- **Topic: Time Series Analysis**
  - Time & Frequency division Multiplexing, Multiple Access, Spread Spectrum System.
  - Introduction to electromagnetic radiation, Attenuation of free space, transmitting & receiving antenna gain,
  - Ground wave, Ionospheric, Line of sight propagation

.

-Essential Readings:

o Roy Blake, " Electronics Communication Systems", 2nd Edition, Thomson Learning Inc, 2005 Chapter 13- Section 13.2 - 13.3,
Chapter 15.1 - 15.3, 15.5 - 15.7

-Additional Reading:

o Simon Haykin "Communication Systems", 5th Edition, Willey ,2017.

o Web links: Principals of Communication:- https://nntel.ac.in/courses/108104091

- Principles of Digital Communications : https://nptel.ac.in/courses/108102120

Module 5 *No. of Hours:08*

- **Topic: Fiber Optic Communication**
  - Introduction, optical fiber, Splices & Connectors, Optical emitter & Detector, repeaters &
  - Optical amplifiers,
  - Submarine cables, SONET,
  - Fiber in local area network, telephone, cable
  - CABLE TV application

-Essential Readings:

o Roy Blake, " Electronics Communication Systems", 2nd Edition, Thomson Learning Inc, 2005 Chapter 24- Section 24.1, 24.2, 24.4, 24.6, 24.7
Chapter 25- Section 25.3, 25.5 -25.9

-Additional Reading:

o Simon Haykin "Communication Systems", 5th Edition, Willey ,2017.

o Web links: Principals of Communication:- https://nntel.ac.in/courses/108104091

3. ASSESSMENT

The assessment for the Communication Systems is divided into two components: Continuous Internal Evaluation (CIE) and Semester End Examination (SEE), each accounting for 50% of the total marks.

The assessment scheme consists of **Continuous Internal Evaluation (CIE)** each carrying **50 marks** and **Semester End Examination (SEE)**.

Continuous Internal Evaluation (CIE) – 50 Marks

- Internal Tests (2): 30 Marks
- Assignments (2): 20 Marks

Semester End Examination (SEE) – 50 Marks

- Written examination of 3 hours duration

3.1 Rubrics for Activity based assessment (0–50 Marks)

Assessment Evaluation:

- Each student is required to complete **two assignments**.
- Each assignment is **evaluated for 50 marks**, which will be **scaled down to 10 marks** for CIE.
- Total Assignment Marks = 10 + 10 = **20 Marks**

Sample Assignments are (Not limited to)

- Comparative analysis of shortwave and FM radio broadcasting.
- Comparative study of noises and spread spectrum mechanism for secrecy or privacy in transmission.
- Seminar on Emerging Trends in Electronic communication, HAM Radio, Bluetooth, wifi etc.
- Design an Amplitude modulated Short wave radio
- Design a cordless Microphone and headset system.

Rubrics for Activity based assessment (50 Marks)

Criteria	41–50 (Excellent)	31–40 (Very Good)	21–30 (Good)	11–20 (Fair)	0–10 (Poor)
Conceptual Understanding (10)	Demonstrates complete and in-depth understanding of concepts	Very good understanding with minor gaps	Adequate understanding of basic concepts	Limited understanding	No understanding of concepts
Technical Accuracy (10)	All technical details are accurate and relevant	Minor technical errors	Some inaccuracies	Many technical errors	Incorrect
Analysis & Relevance to Application (10)	Excellent analysis with strong real-world relevance	Good analysis and application	Moderate analysis	Weak application	No application
Organization & Presentation (10)	Well-structured, clear, neat, and professional	Well organized with minor issues	Average organization	Poor presentation	No logical structure
Originality & Effort (10)	Highly original work with significant effort	Good effort and originality	Moderate effort	Minimal effort	Copied/no effort