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Principles of Electronic Communication — Complete Syllabus

BTEUP Diploma in Electronics Engineering • 4th Semester • Session 2026-27
Subject 4.2 (Theory) + 4.6 (Lab) • Total 200 Marks • 6 Credits

About this document: Principles of Electronic Communication appears twice in the 4th semester — as a theory paper (4.2) and as a lab (4.6). Both are covered here, completely, in the official order. The simulation-experiment list in the lab section is numbered confusingly in the PDF (e.g. “1. 1Simulation”, “7Simulation”); the list below follows the PDF text.

Examination Scheme

Code	Paper	Type	L - P	Credits	Internal	External	Total
4.2	Principles of Electronic Communication	Theory	3 - 0	3	Theory 40	Theory 60 (3 hrs)	100
4.6	Principles of Electronic Communication (Lab)	Practical	0 - 6	3	Practical 60	Practical 40 (3 hrs)	100
Principles of Electronic Communication Total				6	100	100	200

What This Subject Aims To Do

To equip students with a thorough understanding of the fundamental principles of communication — filters, modulation-demodulation and antennas — so they can analyse, troubleshoot and adapt to advancements in communication technologies.

Unit-Wise Complete Topic List

Unit	Topic	Periods	Marks Share
1	Introduction to Communication Engineering	4	10%
2	Amplitude Modulation	11	26%
3	Angle Modulation	11	26%
4	Digital Modulation Techniques	10	24%
5	Introduction to Antennas	6	14%

Unit 1 — Introduction to Communication Engineering (4 Periods, 10%)

Topics: Introduction to electromagnetic frequency spectrum- relationship between wavelength and frequency. Filters: Definition, types of filters and their frequency response characteristics- LPF, HPF and BPF - applications. Noise: Definition, Types of noise and their sources, SNR and noise figure. Distortion - Definition, types of distortion, Difference between noise and distortion. Concept of fidelity, selectivity and sensitivity. Introduction to modulation- Need of modulation, Concept of frequency translation

In simple words: The basics: the frequency spectrum, filters, noise and distortion, and why modulation is needed at all.

Unit 2 — Amplitude Modulation (11 Periods, 26%)

Topics: Definition of amplitude modulation, Expression for AM and its waveform representation, frequency spectrum and bandwidth of AM wave, relative power distribution in carrier and side bands. Elementary idea of DSB, DSB-SC SSB and VSB modulation. Principles of AM modulators: Square Law Modulator, Balanced Modulator. Principles of AM Demodulator: Diode Detector Circuit. Need and Principles of Super Heterodyne Receiver

In simple words: AM: how the carrier is varied by the message, how much power sits in the sidebands, AM modulators and detectors, and the superheterodyne receiver.

Unit 3 — Angle Modulation (11 Periods, 26%)

Topics: Frequency Modulation: Concept of Angle Modulation, Definition of FM modulation, Waveform representation of FM, Expression for FM and its frequency spectrum, modulation index, maximum frequency deviation and deviation ratio, bandwidth a FM signals, Carzon's rule, Pre-emphasis and De-emphasis, FM modulator and demodulator circuit in brief. Phase Modulation: Definition, expression for PM and its frequency spectrum, modulation index, PM modulator and demodulator circuit in brief, comparison of FM, PM and AM communication systems

In simple words: FM and PM: varying the frequency or phase instead of the amplitude, modulation index and bandwidth (Carson's rule), and how FM compares with AM.

Unit 4 — Digital Modulation Techniques (10 Periods, 24%)

Topics: Digital Modulation Techniques- ASK, FSK, PSK, BPSK modulation and demodulation techniques (only block diagram, operation and waveforms)- Basic concept of OFDM. Pulse modulation techniques: Generation and detection of PAM PWM and PPM. Pulse Digital modulation techniques: PCM and DM transmitter and receiver

In simple words: Sending digital data over analog channels: ASK, FSK, PSK and BPSK, pulse modulation (PAM, PWM, PPM), and digital pulse modulation (PCM, delta modulation).

Unit 5 — Introduction to Antennas (6 Periods, 14%)

Topics: Definition of Antenna, Importance and applications of Antenna, Basic parameters: radiation pattern, gain, directivity, impedance, polarization

In simple words: Antennas: what they are, their radiation pattern, gain, directivity, impedance and polarisation.

Practical Work

- Construct and test the performance of LPF,HPF and BPF.
- Construct and test the performance of AM Modulator.
- Construct and test the performance of AM demodulation using envelope detector.
- (a) To obtain an AM wave from a square law modulator circuit and observe waveforms. (b) To measure the modulation index of the obtained wave form. Observe under modulated, 100% modulated & over modulated AM.
- Construct and test the performance of FM Modulator.
- Construct and test the performance of FM demodulator.
- To obtain an FM wave and measure the frequency deviation and modulation index for different modulating signals.

- Test the performance of ASK modulator and demodulator and draw its input and output waveform.
- Test the performance of PSK modulator and demodulator and draw its input and output waveform.
- Test the performance of FSK modulator and demodulator and draw its input and output waveform.
- Construct and test the performance of Sample and Hold Circuit.
- To observe the sampled signal and compare it with the analog input signal. Note the effect of varying the sampling pulse width and frequency on the sampled output.
- To observe and note the pulse amplitude modulated signal (PAM) and compare them with the corresponding analog input signal.
- To observe PPM signal and compare it with the analog input signal.
- To observe PWM signal and compare it with the analog input signal.
- Construct and test the performance of Pulse Width Modulator.
- Determine the directional characteristics of Moving Coil Microphone.
- Determine the directional characteristics of Dynamic core Loudspeaker.
- Test the performance (its field strength, radiation pattern, bandwidth, efficiency, polarization, and gain) of a given dipole antenna. Plot the radiation pattern for different length of antennas.
- Test the performance of given Yagi-Uda antenna.

Simulation Experiments — any 10 to be performed through open source simulation tools

- Simulation of frequency response of LPF.
- Simulation of frequency response of HPF.
- Simulation of frequency response of BPF.
- Simulation of DSB modulation and demodulation.
- Simulation of DSB-SC modulation and demodulation.
- Simulation of SSB modulation and demodulation.
- Simulation of FM modulation and demodulation.
- Simulation of PM modulation and demodulation.
- Simulation of ASK modulation and demodulation.
- Simulation of PSK modulation and demodulation.
- Simulation of BPSK modulation and demodulation.
- Simulation of FSK modulation and demodulation.
- Simulate the sampling of an analog signal.
- Simulation of PAM generation.
- Simulation of PWM generation.

- Simulation of PPM generation.
- Simulation of Delta Modulation.
- To simulate and analyse the performance of different types of dipole antenna and understand their key parameters such as radiation patterns, gain, directivity, and bandwidth.
- To simulate and analyse the performance of different types of Yagi-Uda antenna and understand their key parameters such as radiation patterns, gain, directivity, and bandwidth.
- To design a basic communication system.

Reference Books (as listed in the syllabus)

- Principles of communication systems by Taub Schilling, T.M.H.
- Fundamentals of communication systems by Proakis & Salehi, Pearson education
- Communication Systems by Simon Haykin, John Wiley
- Communication Systems (Analog and Digital) By R.P. Singh, S.D. Sapre, T.M.H.
- Modern Digital & Analog Communication by B.P. Lathi, Oxford Publications
- Rahul Wadhwa, Principles of Communication Engineering Asian Publishers, Muzaffarnagar. ISBN: 978-93-5502-128-1
- Digital & Analog Communication Systems by K.S. Shanmugam, John Wiley
- E-books/e-tools to be used as recommended by AICTE/NITTTR, Chandigarh.

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Source: BTEUP 2nd Year curriculum (folder2627), approved in C.D.C. meeting held on 16.07.2026. Topic lists follow the official syllabus; short explanations are the author's own plain-English summaries, not syllabus text.

Please confirm with your own polytechnic for any local changes.