

COURSE TITLE : COMMUNICATION ENGINEERING
COURSE CODE : 3041
COURSE CATEGORY : B
PERIODS/WEEK : 4
PERIODS/SEMESTER : 60/3
CREDITS : 4

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Radiation and wave propagation.	15
2	Modulation techniques.	15
3	Radio transmitters.	15
4	Radio receivers.	15
TOTAL		60

Course General Outcome:

Module	GO	On completion of this course the student will be able:
1	1	To understand the Electro-Magnetic Radiation and Wave Propagation.
	2	To understand Antenna.
2	3	To comprehend Modulation Techniques in Communication.
	4	To understand Pulse Modulation Schemes.
3	5	To understand the working of Radio Transmitters.
	6	To understand noise in Communication Systems.
4	7	To understand Demodulation And Radio Receivers.

GO - General Outcome

On completion of this course the student will be able:

MODULE I : Radiation and Wave Propagation.

1.1.0 To understand Electro Magnetic Radiation and Wave Propagation.

- 1.1.1 To define ELECTRIC AND MAGNETIC fields.
- 1.1.2 To define EM wave.
- 1.1.3 To explain types of EM wave.
- 1.1.4 To list the types of Wave Propagation.
- 1.1.5 To explain Ground Wave Propagation.
- 1.1.6 To describe the factors affecting the field strength in Ground Wave Propagation.
- 1.1.7 To explain the Space Wave Propagation.

- 1.1.8 To describe the factors affecting the Space Wave Propagation (effect of curvature of earth).
- 1.1.9 To explain Layers Of Ionosphere, its significance in communication.
- 1.1.10 To define- Skip Distance, Max Usable Frequency (MUF), Critical Frequency, Virtual Height.
- 1.1.11 To explain Atmospheric effect such as Refraction, Diffraction and Reflection.

1.2.0 To understand Antenna.

- 1.2.1 To explain the physical concept Of Radiation Of Electromagnetic Energy.
- 1.2.2 To describe Radiation Patterns.
- 1.2.3 To explain the different types of Antenna such as Half Wave Dipole, Folded Dipole.
- 1.2.4 To explain the working Of Parabolic Antenna.
- 1.2.5 To define Smart Antenna.
- 1.2.6 To define MANET and its applications.

MODULE II Modulation Techniques

2.1.0 To Comprehend Modulation Techniques in Communication.

- 2.1.1 To state the need for Modulation.
- 2.1.2 To state the basic principle of Amplitude Modulation, Frequency Modulation and Phase Modulation.
- 2.1.3 To define AM, FM and PM.
- 2.1.4 To draw the waveform of AM.
- 2.1.5 To deduce expression for Amplitude Modulated Wave.
- 2.1.6 To define Modulation Index of AM.
- 2.1.7 To describe Frequency Spectrum of AM.
- 2.1.8 To explain the AM Modulator Circuits (Collector Modulation).
- 2.1.9 To explain Balanced Modulator.
- 2.1.10 To illustrate the Frequency Spectrum of DSBSC, SSBSC and VSB.
- 2.1.11 To draw the modulated waveform of FM.
- 2.1.12 To define modulation index of FM.
- 2.1.13 To describe Frequency Spectrum and Band Width of FM.
- 2.1.14 To compare AM and FM.

2.2.0 To understand Pulse Modulation Schemes.

- 2.2.1 To state Sampling Theorem and its significance.
- 2.2.2 To list various Pulse Modulation Schemes.
- 2.2.3 To illustrate different Pulse Modulation Techniques.
- 2.2.4 To explain Pulse Code Modulation.
- 2.2.5 To list different Digital Carrier Modulation Schemes.

MODULE III Radio Transmitters

3.1.0 To understand the working of Radio Transmitter.

- 3.1.1 To explain the Block Diagram of AM Transmitter.
- 3.1.2 To explain the Block Diagram of FM Transmitter (direct FM and indirect FM).
- 3.1.3 To define Pre-Emphasis and De-Emphasis.
- 3.1.4 To describe AFC.

3.2.0 To understand noise in Communication System.

- 3.2.1 To explain different types of noises.
- 3.2.2 To define signal to noise ratio.
- 3.2.3 To state the different measures to improve signal to noise ratio.

MODULE IV Radio Receivers

4.1.0 To understand Demodulation and Radio Receivers.

- 4.1.1 To define Demodulation.
- 4.1.2 To explain Super Heterodyne Receiver.
- 4.1.3 To explain AM Demodulation Circuits using Diode Detector.
- 4.1.4 To explain simple and delayed AGC.
- 4.1.5 To define Selectivity, Sensitivity, Fidelity and Noise Figure of Radio Receivers.
- 4.1.6 To explain the operation of FM Radio Receiver.
- 4.1.7 To state the need of limiter in FM receiver.
- 4.1.8 To compare AM & FM Receivers.

CONTENT DETAILS

MODULE I Electromagnetic Radiation and Wave Propagation.

Electric and magnetic fields - electromagnetic wave - polarization types of EM wave - types of wave propagation - ground wave propagation - factors affecting the field strength in groundwave propagation - spacewave propagation - factors affecting the spacewave propagation - atmospheric effects - refraction, diffraction and reflection- ionosphere and its layers - layer characteristics - skip distance - MUF - critical frequency - virtual height - antenna - physical concepts of radiation of electromagnetic wave - radiation pattern - half wave dipole, folded dipole and parabolic antenna - smart antenna - definition - MANET – definition - applications.

MODULE II Modulation Techniques

Need for modulation - AM, FM and PM – basic principle - definition - AM – waveform - expression for AM voltage - modulation index - significance of side bands - frequency spectrum - AM modulator circuit - balanced modulator - DSBSC, SSBSC and VSB - frequency spectrum - FM - definition - waveform - modulation index - frequency spectrum and band width - comparison of AM and FM - sampling theorem

- pulse modulation schemes - PAM, PWM and PPM - waveforms - pulse code modulation (PCM) - digital carrier modulation schemes

MODULE III Radio Transmitters

Block diagram of AM transmitter - function of each block - block diagram of a FM transmitter - direct and indirect FM generation - pre-emphasis and de-emphasis - AFC - noise in communication systems - different types of noise - signal to noise ratio - methods to improve signal to noise ratio

MODULE IV Demodulation and Radio Receivers.

Need for demodulation - principles of superhetrodyne receiver - block diagram of superhetrodyne receiver - AM demodulator circuits - diode detector - simple and delayed AGC - choice of IF in super heterodyne receiver - characteristics of radio receiver - selectivity, sensitivity, fidelity and noise figure - block diagram of FM receiver - need for limiter in FM receiver - comparison of FM and AM receiver

TEXT BOOKS

1. Electronic Communication Systems - Frank R Dungan - 3rd Edition – Thomson.
2. Electronic Communication Systems – George Kennedy – TMH.

REFERENCE

1. Electronic communications - Roddy and Coolen – PHI.
2. Electronic Communication Systems - Blake - Thomson and Delmar.
3. Electronic Communication Systems - Wayne Thomasi.
4. Principles of Electronic Communications –pradeep Kumar Ghosh