

**Course Name:** Electronics Engineering Group.

**Course Code:** ET/EN/EX/EJ/ED/EI

**Semester** : Fourth

**Subject Title** : Analog Communication

**Subject Code:** 9073

**Teaching and Examination Scheme:**

Teaching Scheme			Examination Scheme						
TH	TU	PR	Paper Hrs	TH	TEST	PR	OR	TW	TOTAL
02	--	02	03	80	20	--	--	25@	125

**Rationale:**

Communication plays vital role in our lives. Development in communication technology have increased its applications in allied fields of electronics including satellite, mobile, RADAR, telephony, telegraphy, industrial controls, etc.

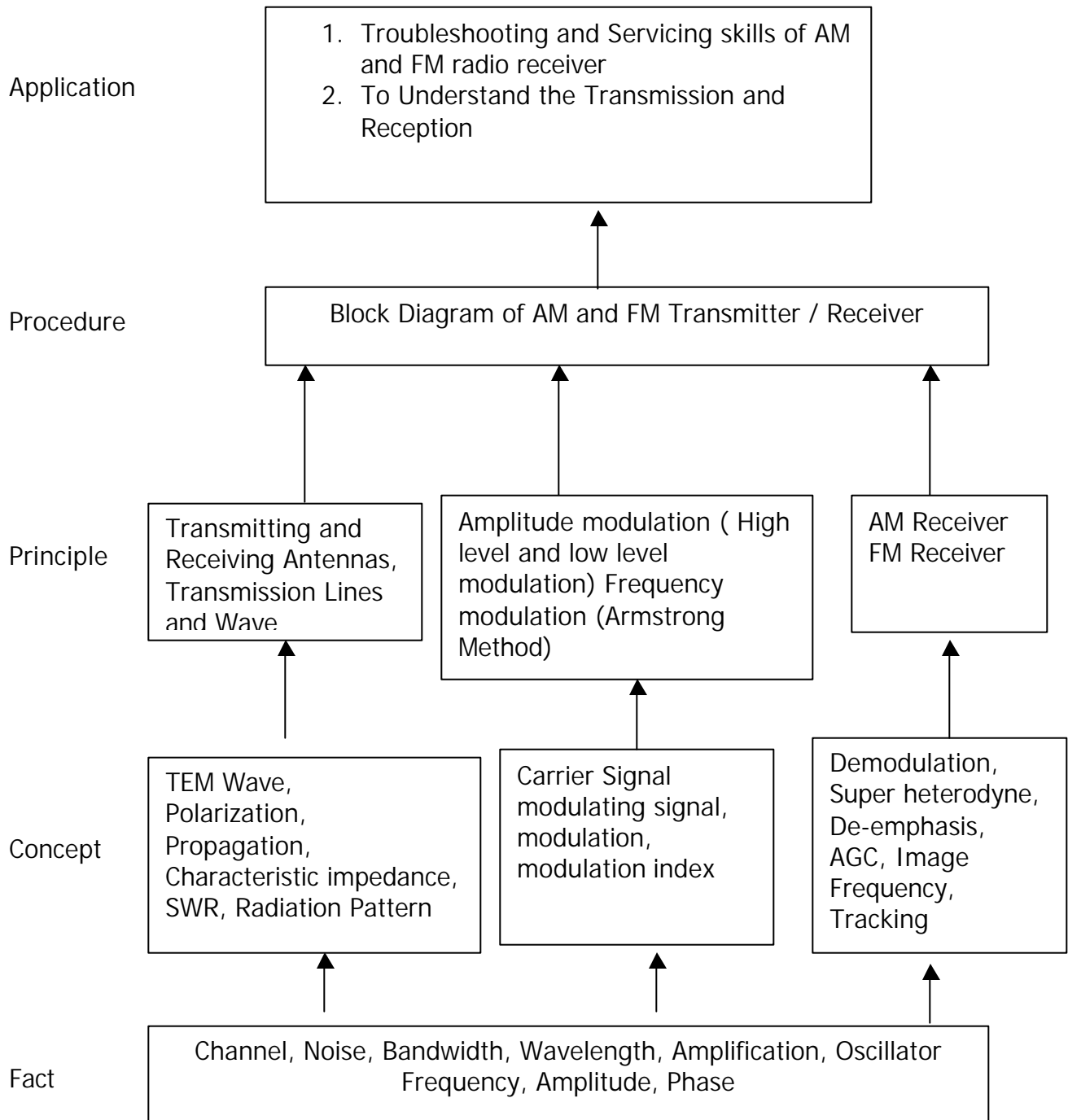
It is the technology subject which expert the student to understand the operation and faultfinding of AM & FM transmitter, AM & FM radio receiver & identifying different antennas.

**Objectives:**

The student should able to

1. Classify different types of communication system.
2. Explain electromagnetic spectrum.
3. Describe amplitude modulation & its types.
4. Identify different section in radio receiver.
5. Troubleshooting AM / FM radio receivers
6. To describe FM.
7. Compare AM & FM.
8. Describe different parameter of transmission line and their radiation pattern.
9. Describe different types of wave propagation and their application.

## Learning Structure:



## Content: Theory

Chapter	Chapter Name & Content	Hours	Marks
1	<b>Introduction to electronic communication</b> 1.1 Importance 1.2 Block diagram of communication system 1.3 Modulation 1.3.1 Need for modulation 1.4 Types of Electronics communications 1.4.1 Simplex 1.4.2 Duplex – Full & Half 1.4.3 Digital 1.4.4 Analog 1.5 Applications of communication 1.6 The electromagnetic spectrum (different bands & their frequencies) 1.7 Concept of Transmission bandwidth.	02	04
2	<b>Amplitude modulation &amp; Frequency modulation</b> 2.1 Definition 2.2 Modulation index – definition, its effect on modulated signal, simple numerical. 2.3 Mathematical representation of amplitude modulated wave & its meaning (concept of sidebands) 2.4 Bandwidth requirement 2.5 Representation of AM signal in time & frequency domain. 2.6 Power relation in AM wave, simple numerical. 2.7 Frequency modulation (definition) 2.8 Definition – Deviation ratio, max. Deviation ratio. 2.8 Mathematical representation of frequency modulation and its meaning. 2.9 Representation of frequency modulated signal in time domain and frequency domain. 2.10 Bandwidth requirement – simple numerical 2.11 FM signal generation using reactance modulator circuit (transistorized). 2.12 Concept with graph-pre emphasis and de-emphasis. 2.13 Block diagram of FM transmitter explanation with waveform (Armstrong frequency modulation system)	06	20
3	<b>Radio receivers (AM &amp; FM)</b>	09	22

	<p>3.1 Principle of heterodyne</p> <p>3.2 Block diagram of super heterodyne receiver and its working with waveforms.</p> <p>3.3 Characteristics of AM radio receiver- Sensitivity, Selectivity, and Fidelity.</p> <p>3.4 Demodulation of AM signal.</p> <p>3.5 Need of AGC and its type – simple, delayed (with graph)</p> <p>3.6 Block diagram of FM receiver explanation with waveform.</p> <p>3.7 FM Detector – slope detection, transformer action at above &amp; below resonance ratio detector (diode circuit), PLL (block diagram and operation) explanation with vector diagram.</p>		
4	<p><b>Transmission lines</b></p> <p>4.1 Fundamentals of transmission line.</p> <p>4.2 Equivalent circuit of transmission line</p> <p>4.2.1 General equivalent circuit</p> <p>4.2.2 RF equivalent circuit</p> <p>4.3 Characteristics impedance, methods of calculations &amp; simple numerical.</p> <p>4.4 Losses in transmission line.</p> <p>4.5 Standing wave – SWR, VSWR, Reflection coefficient, simple numerical.</p> <p>4.6 Quarter wave &amp; half wavelength line</p> <p>4.6.1 Impedance inversion by quarter wavelength line</p> <p>4.6.2 Quarter wave transformer &amp; impedance matching</p> <p>4.6.3 Properties of line of various lengths.</p> <p>4.7 Impedance matching</p> <p>4.7.1 Stubs – single &amp; double</p> <p>4.7.2 Baluns</p>	05	12
5	<p><b>Antennas</b></p> <p>5.1 Antennas fundamentals.</p> <p>5.1.1 Radiation mechanism.</p> <p>5.1.2 Concept &amp; definition of polarization, bandwidth, beam width, antenna resistance, directivity, antenna gain, power density.</p> <p>5.2 Dipole antenna</p> <p>5.2.1 Half wave dipole antenna</p> <p>5.2.2 Radiation pattern</p> <p>5.3 Folded dipole antenna &amp; its radiation pattern.</p>	05	10

	5.4 Structure, Radiation pattern & applications of the following antennas. i. Loop antenna ii. Ferrite loop antenna iii. Telescopic antenna iv. Yagi-uda antenna v. Microwave antennas- Dish antenna & Horn antenna.		
6	<b>Wave Propagation</b> 6.1 Fundamental of electromagnetic wave. 6.2 Transverse electromagnetic wave, polarization. 6.3 Ground wave 6.4 Ionosphere 6.5 Sky wave propagation 6.6 Concept of actual height and virtual height. 6.7 Definition – critical frequency, max. useable frequency, skip distance, fading 6.8 Space wave propagation. 6.9 Duct propagation 6.10 Troposphere scatter propagation	05	12
	Total	32	80

### Practical:

#### Intellectual Skills:

1. Reading
2. Sourcing of Web sites

#### Motor Skill:

1. Testing
2. Measurement

### List of Practical: (Any Ten)

1. Observe AM the AM Signal on Spectrum Analyzer
2. Observe FM wave & calculate modulation index.
3. Visit to transmitter station & prepare a report.
4. Draw the circuit diagram & layout of AM radio receiver.
5. Voltage waveform analysis at various points in AM radio receiver.

6. Observe input & output waveforms of AM detector.
7. Plot graph of sensitivity of receiver.
8. Plot graph of selectivity of receiver.
9. Plot graph of fidelity of receiver.
10. Fault finding of AM radio receiver.
11. Create two faults in each section OR fault finding in FM radio receiver, Create two faults in each section
12. Prepare a report on different types of radio receivers available in market. find out their specifications, IC used etc
13. FM detector characteristics.
14. Measure the length of directors, reflectors, dipoles and spacing between them of Yagi uda antenna and compare with the theoretical value.
15. Plot the directional pattern of given antenna.

**Prepare any two mini projects:**

1. AM/FM Radio Receiver/Transmitter using transistor
2. AM modulator/detector/mixer using diode
3. FM detector

**Learning Resources:**

**Books:**

Sr. No.	Author	Title	Publisher
01	George Kennedy	Electronic Communication System	Tata McGraw-Hill
02	Roddy Collen	Electronic Communication	Prentice Hall India
03	Louis E. Frenzel	Communication Electronics	Tata McGraw-Hill
04	Hsu & Mitra	Analog & Digital Communication-	Tata McGraw-Hill