

COURSE NAME : INFORMATION TECHNOLOGY AND MEDICAL ELECTRONICS
COURSE CODE : IF/MU
SEMESTER : FIFTH
SUBJECT TITLE : COMMUNICATION TECHNIQUES
SUBJECT CODE : 9116

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS.	TH	TEST	PR	OR	TW	TOTAL
03	--	02	03	80	20	--	25#	25@	150

Rationale:

In today's world, communication has gained lot of importance and many systems related to communication have been developed like Satellite Communication, Television, Digital Communication and Data Communication.

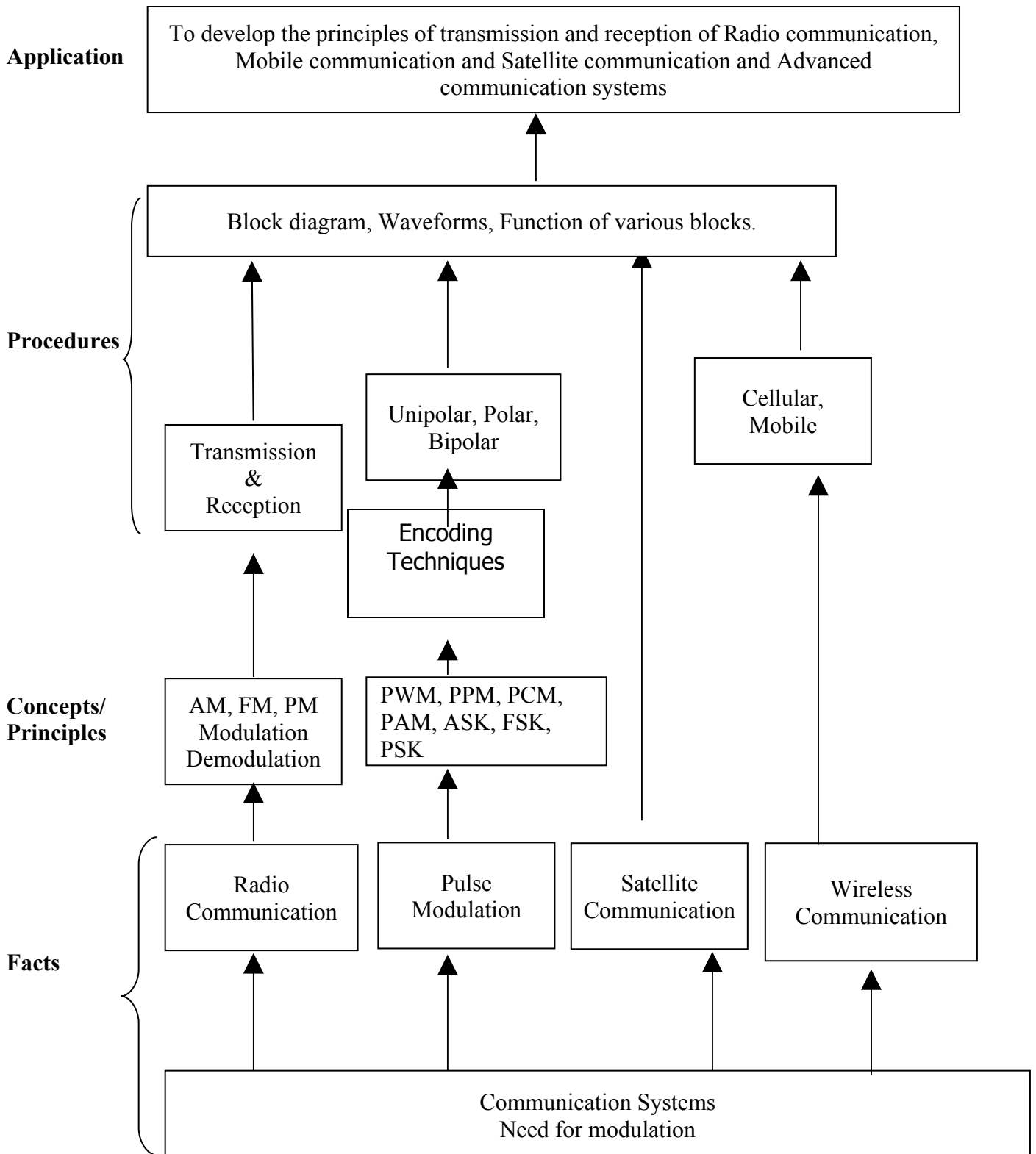
Electronic Communication techniques is a core technology subject which will help students to apply the fundamentals of Electronics for understanding Line of Sight Communication, Sky-wave Communication, Mobile Communication and Satellite communication. It is a theoretical subject, which will enable the students to develop cognitive skills.

Objectives:

The student will be able to

1. Identify the need for modulation.
2. Draw electromagnetic spectrum.
3. Draw the block diagram for transmitting AM, FM, PM, Pulse modulation, PCM, ASK, FSK and PSK modulation techniques.
4. Draw related waveforms, measure and verify the depth of modulation.
5. Describe Satellite and Cellular Mobile Communication systems.
6. Use the various data encoding techniques in digital communication system.
7. Describe the telephone system and digital carrier system.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	Introduction To Electronic Communication	08	12
	1.1 Block diagram of communication system.		
	1.2 Electromagnetic spectrum.		
	1.3 Need for Modulation.		
	1.4 Concept of noise		
	1.5 Classification of communication systems.		
	1.6 Radio communication Comparison of AM, FM, PM on the basis of Definition, Waveforms, Bandwidth Requirement, Representation in Time domain and Frequency Domain, Modulation Index.		
	1.7 Demodulation in AM, FM (methods not necessary)		
	1.8 Block diagram and function of each block of : (a) AM Transmitter and Receiver. (b) FM Transmitter and Receiver.		
02	Wave Propagation	04	08
	2.1 Fundamentals of Electromagnetic wave.		
	2.2 Transverse electromagnetic wave.		
	2.3 Polarization.		
	2.4 Ground Wave.		
	2.5 Ionosphere.		
	2.6 Sky Wave Propagation, Effect of changes in atmospheric conditions on sky wave propagation.		
	2.7 Concept of actual height and virtual height.		
	2.8 Definitions: <ul style="list-style-type: none"> • Critical frequency. • Maximum usable frequency. • Skip distance. • Fading. 		
	2.9 Space Wave Propagation.		
	2.10 Duct Propagation.		
2.11 Troposphere scatters propagation.			
03	Pulse Modulation Techniques & Signal Processing	14	20
	3.1 Basics of Pulse Modulation : <ul style="list-style-type: none"> • Sampling Theorem • Natural Sampling • Flat Top Sampling • Nyquist Rate. 		
	3.2 Advantages of Pulse modulation over AM.		
	3.3 Block Diagram for generation, Waveforms, working principle, advantages, disadvantages and applications of PAM, PWM, PPM.		
	3.4 Block Diagram for generation, working principle, waveforms, advantages, disadvantages and applications of : ASK , FSK, QPSK, BPSK, DPSK.		
	3.5 Introduction to Digital Communication System : Digital modulation methods		
	3.6 Block diagram, working principle, waveforms, advantages,		

	<p>disadvantages and applications of PCM, Delta modulation, Adaptive delta modulation.</p> <p>3.7 Baseband and Passband Transmission</p> <p>3.8 Multiplexing Techniques: FDM, TDM, and WDM - Definition, Schematic diagram, Principle, application, advantages and disadvantages.</p>		
04	<p>Data Encoding And Transmission</p> <p>4.1 Introduction to encoding digital data to digital signal.</p> <p>4.2 Encoding techniques viz. unipolar, polar, Bipolar and their types.</p> <p>4.3 Comparison of various techniques.</p> <p>4.4 Definitions :</p> <ul style="list-style-type: none"> • Data Rate. • Baud Rate. • Bit rate. • Channel Bandwidth. • Channel Capacity • S/N Ratio. 	06	12
05	<p>Satellite Communication And Mobile Communication</p> <p>5.1 Block diagram of Satellite communication system.</p> <p>5.2 Brief introduction to Communication and orbits.(Elevation and Azimuth angles of satellite)</p> <p>5.3 Uplink model, Transponder and Downlink model and the frequencies used.</p> <p>5.4 Frequency band used in Satellite communication.</p> <p>5.5 Functions of a satellite.</p> <p>5.6 Concept of antenna</p> <p>5.7 Construction and working principle of Parabolic dish and horn antenna.</p> <p>5.8 Satellite application overview.</p> <p>5.9 Principle, advantages and disadvantages of TDMA, FDMA, CDMA</p> <p>5.10 Concepts of mobile phone.</p> <p>5.11 Block diagram of cellular mobile phone system and description.</p> <p>5.12 Frequency band and types of modulation used for Cellular mobile communication.</p> <p>5.13 Call processing, Frequency reuse and cell splitting. Forward and reverse direction (handset to handset) and (Handset to Landline)</p> <p>5.14 Hand Off procedure.</p>	10	18
06	<p>Analog And Digital Carrier Systems</p> <p>6.1 Telephone Carrier system.</p> <p>6.2 Analog Carrier system Switched , Leased, Analog hierarchy</p> <p>6.3 Digital Carrier system Switched , Leased Digital hierarchy, T-lines</p> <p>6.4 Digital Subscriber Line.</p>	06	10
Total		48	80

Practical:

Skills to be developed:

Intellectual skills:

1. Interpretation skills
2. Encoding techniques

Motor Skills:

- 1 Observation
2. Draw graphs

List of Practical:

1.
 - i) To generate and observe AM waveform using Collector modulator and calculate modulation index.
 - ii) Observe the effect of change in modulating signal voltage on modulation index.
2.
 - i) To generate and observe FM waveform and calculate modulation index.
 - ii) Observe the effect of change in modulating signal voltage and frequency on modulation index.
3.
 - i) To generate PAM and draw input/ output waveforms and measure amplitude of each pulse.
 - ii) Observe the demodulated output and measure its amplitude and frequency.
4.
 - i) To generate PPM and draw input/ output waveforms and measure the shift in position of pulse.
 - ii) Observe the demodulated output and measure its amplitude and frequency.
5.
 - i) To generate PWM and draw input/ output waveforms and measure width of each pulse
 - ii) Observe the demodulated output and measure its amplitude and frequency.
6. To generate PCM and draw input/ output Waveforms. From the sampled outputs, measure the quantum levels.
7. To observe the demodulated output waveform of a PCM signal and measure the output voltage and frequency.
8. To generate ASK signal and draw input/ output waveforms.
9. To generate FSK signal and draw input/ output waveforms.
10. To generate PSK signal and draw input/ output waveforms.
11. Assume a data stream consisting of 12 bits and implement various encoding techniques and draw the waveforms.

12. Visit to any mobile communication station. A technical report of visit shall be submitted as a part of term work.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	Kennedy	Electronic Communication System	Tata McGraw Hill
02	Roddy Collen	Electronic Communication	Prentice Hall of India
03	Forouzan	Data Communication & Networking	Tata McGraw Hill
04	William Lee	Mobile Cellular Telecommunication	McGraw Hill
05	William Schwaber	Electronic Communication System	Prentice Hall of India
06	Frenzel	Communication Electronics	Tata McGraw Hill
07	Wayne Tomasi	Electronic communication systems	Prentice Hall of India
08	Anita S. Diwakar & Rahul Kulkarni	Electronic communication systems	Tata McGraw Hill