

GOVERNMENT POLYTECHNIC, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

Programme	:	Diploma in ET/CE/EE//ME/MT/CM/IT/DDGM
Programme Code	:	01/02/03/04/05/06/07/08/21/22/23/24/26/16/17
Name of Course	:	Analog Communication
Course Code	:	ET 385

Teaching Scheme:

	Hours /Week	Total Hours
Theory	04	64
Practical	02	32

Evaluation Scheme:

	Progressive Assessment	Semester End Examination			
		Theory	Practical	Oral	Term work
Duration	Two class tests, each of 60 minutes	3 Hrs.	3 Hrs.	--	--
Marks	20	80	50	--	--

Course Rationale:

This subject is introduced with the view that students are made familiar with basics of communication system like Amplitude, Frequency Modulation and modern communication systems.

Course Objectives:

After studying this course, the student will be able to

- To understand concept of analog Communication system
- To develop skills to enable them to operate and service the circuits in the systems
- Understand the operation of AM/ FM transmitter and receiver.
- Understand the concept of radio wave propagation.

GOVERNMENT POLYTECHNIC, PUNE
(An Autonomous Institute of Govt. of Maharashtra)

Course Content:

Chapter No.	Name of Topic/Sub topic	Hrs	Marks
SECTION I			
1.	Basics of Electronic Communication.		
	1.1 Introduction <ul style="list-style-type: none"> • The importance of electronic communication. • Definition: Analog signal, Digital signal, Baseband signal • The elements of basic electronic communication system • (Draw block diagram and explain each block.): • Noise in communication system and types • Types of electronic communication. Simplex, Duplex- full / Half. • The electromagnetic spectrum. • Concept of transmission bandwidth. 	10	10
	1.2 Basics of Modulation <ul style="list-style-type: none"> • Need for modulation • Types: AM, FM, PM. Definition ,waveforms 		
2.	Amplitude Modulation		
	2.1 Modulation index-(Time domain display method) <ul style="list-style-type: none"> • Definition, its effect on modulated signal, Simple numerical. • Mathematical representation of amplitude modulated wave & its meaning., • Bandwidth requirement • Representation of AM signal in time & frequency domain • Power relations in AM wave, simple numerical 	10	12
	2.2 AM Transmitter <ul style="list-style-type: none"> • Block diagram of AM transmitter(low level and high level) and its operation • Circuit and operation of AM modulators using collector modulator class C amplifier 		
	2.3 Concepts of side band <ul style="list-style-type: none"> • SSB • DSB • Suppress carrier(DSBSC,SSBSC) • Generation of SSBSC using frequency discriminator method, Phase discriminator method, Phase shift method 		
3	Frequency and Phase modulation		
	3.1 Frequency modulation <ul style="list-style-type: none"> • Deviation ratio, maximum deviation ratio, mathematical representation of FM & its meaning 	10	12

GOVERNMENT POLYTECHNIC, PUNE
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	<ul style="list-style-type: none"> Representation of FM signal in time domain & frequency domain Bandwidth requirements and simple numerical Concept of Pre-emphasis & De-emphasis Generation of FM -Reactance modulator, varactor diode FM Transmitter (Armstrong Method), circuit diagram and its working 		
	3.2 Phase Modulation		
	<ul style="list-style-type: none"> Phase modulation(Definition), Representation of PM signal comparative advantages & disadvantages of AM ,FM&PM 		
4	Noise and transmission lines		
	4.1 Noise <ul style="list-style-type: none"> Definition S/N ratio Sources of noise Only Types of Noise(External, Internal) 	06	06
	4.2 Transmission Lines <ul style="list-style-type: none"> Equivalent circuit of transmission line (general, RF Equivalents.) Characteristics impedance and its method of calculation, Simple Numerical. Losses in transmission line. 		
SECTION II			
5	Radio Receiver		
	5.1 Demodulation <ul style="list-style-type: none"> Basic principles of demodulation 	12	16
	5.2 Demodulation of AM signal <ul style="list-style-type: none"> Diode detector, practical diode detector. Need of AGC & its types – simple, delayed. 		
	5.3 FM detector <ul style="list-style-type: none"> Simple slop detector Balanced slope detector Phase Discriminator Ratio detector. PLL as FM demodulator 		
	5.4 Radio Receiver Types <ul style="list-style-type: none"> Block diagram of Tuned Radio Frequency receiver and its Working with waveforms. Block diagram of AM super heterodyne receiver and its Working with waveforms. RF Section and Characteristics of AM radio receiver (Sensitivity, selectivity, fidelity) Image frequency and its rejection, Frequency changing and tracking(Two point and tree point tracking) 		
6	Radio Wave Propagation		

GOVERNMENT POLYTECHNIC, PUNE
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	6.1 Introduction <ul style="list-style-type: none"> • Fundamental of electromagnetic waves , • Transverse electromagnetic wave, • polarization 		
	6.2 Types of Wave Propagation <ul style="list-style-type: none"> • Ground Wave. • Sky wave, ionosphere & its effect. • Space Wave , Duct propagation • Troposphere scatter propagation • Concept of actual height & virtual weight • Critical frequency, skip distance & fading, maximum usable frequency 	10	12
7	Pulse Modulation		
	<ul style="list-style-type: none"> • Sampling theorem, • Natural sampling, • flat top sampling , • sample & Hold circuit, • PAM, PWM, PPM (Definition and Wave forms) 	04	06
8	Antennas		
	8.1 Antenna fundamentals <ul style="list-style-type: none"> • Resonant antenna and Non-resonant antennas • Definition : Radiation pattern ,polarization, bandwidth, beam width, antenna resistance, directivity & power gain, antenna gain 		
	8.2 Dipole antenna <ul style="list-style-type: none"> • Half wave dipole antenna (Resonant Antenna) & its Radiation Pattern. • Folded dipole antenna & its radiation pattern. • Radiation pattern for Dipole Antenna of different length. 	04	06
	8.3 Structure, radiation pattern & application of antennas. <ul style="list-style-type: none"> • Loop antenna. • Telescopic antenna. • Yagi-Uda antenna • Micro wave antenna – Dish antenna &Horn antenna • Micro strip patch antennae- Rectangular, square and circular 		
	TOTAL	64	80

GOVERNMENT POLYTECHNIC, PUNE
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List of Practical/Experiments/Assignments:

Sr. No.	Name of Experiment/Assignment
1.	Observe and draw the waveform of AM & calculate modulation index of AM
2.	Observe and draw input/output waveforms of AM detector.
3.	Observe and draw the waveform of FM & calculate modulation index of FM
4.	Observe and draw the waveforms of FM modulator
5.	Observe and draw the waveforms of FM demodulator
6.	Observe the wave forms at various points in AM receiver.
7.	Observe & Plot the graph of RF Characteristics of Radio Receiver: Selectivity, Sensitivity, Fidelity
8.	Observe the wave forms PAM and PWM.
9.	Observe the wave forms PPM
10.	Study of analog sampling and reconstruction of signal.
11.	Study of various antennas.
12.	Plot the radiation pattern of Dipole & Yagi-Uda antenna.
13.	Measure the characteristic impedance of co-axial cable Find the impedance and VSWR.

Instructional Strategy:

Sr. No.	Topic	Instructional Strategy
1.	Basics of Electronic Communication.	Classroom teaching
2.	Amplitude Modulation	Classroom teaching & laboratory work.
3.	Frequency and Phase modulation	Classroom teaching & laboratory work.
4.	Radio Receiver	Classroom teaching & laboratory work.
5.	Noise and transmission lines	Classroom teaching & laboratory work.
6.	Radio Wave Propagation	Classroom teaching & laboratory work.
7.	Pulse Modulation	Classroom teaching
8.	Antennas	Classroom teaching & laboratory work

Text Books:

Sr. No	Author	Title	Publication
1.	Kennedy	Principles of communication	McGraw Hill
2.	Roddy Collen	Electronic communication	Prentice Hall
3.	Wayne Tomasi	Electronic Communication System	Pearson

Reference Books:

Sr. No	Author	Title	Publication
1.	Louis E Frenzel	Communication Electronics	TATA Mc-Graw Hill 5th Edition
2.	Taub & Schilling	Principles of communication system	McGraw Hill
3.	M.L.Gupta	Electronic & Radio Engineering	Dhanpat Rai Pub.

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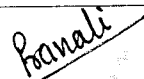

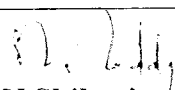
Learning Resources:

Reference Books, Journals, Data Manuals, Computer Based Teaching.

Specification Table:

Sr. No.	Topic	Cognitive Levels			Total
		Knowledge	Comprehension	Application	
1.	Basics of Electronic Communication	3	4	5	12
2.	Amplitude Modulation	3	4	5	12
3.	Frequency and Phase modulation	3	4	5	12
4.	Radio Receiver	4	4	4	12
5.	Noise and transmission lines	3	2	3	08
6.	Radio Wave Propagation	4	3	3	10
7.	Pulse Modulation	2	2	2	6
8.	Antennas	3	-	5	08
Total		25	23	32	80

Prepared By:

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