ARSD College, University of Delhi

Model Course Handout/Lesson Plan

Course Name : B.Sc. (H) Electronics						
Semester	**Course Code**	**Course Title**	**Lecture (L)**	**Tutorial (T)**	**Practical (P)**	**Credit (C)**
VI	32511608	**Communication Electronics**	4			4
Teacher/Instructor(s)		Dr. Nisha Jha				
Session		2021-22				

Course Objective:

- To introduce basic concepts of various modulation techniques used in communication systems and analyze their comparative performance.
- To understand the effect of noise on communication receivers.

Course Learning Outcomes:

- Understand the basic concept of a communication system and need for modulation
- Evaluate modulated signals in time and frequency domain for various continuous modulation techniques
- Describe working of transmitters and receivers and effect of noise on a communication system
- Understand baseband Pulse Modulation

Lesson Plan:

Unit No.	Learning Objective	Lecture No.	Topics to be covered
1	**Introduction, Amplitude modulation**	1-2	Block diagram of an electronic communication system
		3-4	Electromagnetic spectrum-band designations and applications,
		5-6	Need for modulation, concept of channels and base-band signals.
		7-8	Basics of Amplitude Modulation,
		9-10	generation of AM (balanced modulator, collector modulator)

		11-12	Amplitude Demodulation (diode detector)
		13-14	Double side band suppressed carrier, DSBSC generation (balanced modulator),
		15-16	Single side band suppressed carrier,
		17-18	SSBSC generation (filter method, phase cancellation method, Weaver‘s method),
		19-20	Introduction to other forms of AM (Pilot Carrier Modulation, Vestigial Side Band modulation, Independent Side Band Modulation)
2	**Angle modulation**	21-22	Frequency and Phase modulation
		23-24	modulation index and frequency spectrum
		25-26	equivalence between FM and PM
		27-28	Generation of FM (direct methods)
		29-30	Generation of FM (indirect methods)
		31-32	FM detector (PLL)
		33-34	Comparison between AM, FM and PM
3	**Transmitters, Receivers and Concept of Noise**	35-36	Low-level and high-level modulation, AM transmitter, FM transmitter.
		37-38	Receiver parameters: sensitivity, selectivity and fidelity
		39-40	AM receiver, FM receiver
		41-42	External noise, internal noise, signal to noise ratio
		43-44	noise factor, noise temperature, Friis formula
4	**Pulse Analog Modulation and Pulse Code Modulation**	45-46	Sampling theorem, Pulse Amplitude Modulation (PAM),
		47-48	Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM).
		49-50	Generation and detection of PAM, PWM, PPM signals
		51-52	Generation and detection of PWM, PPM signals
		53-54	Need for digital transmission, Quantizing
		55-56	Uniform and Non-uniform Quantization,
		57-58	Quantization Noise,
		59-60	Companding, Coding, Digital Formats. Decoding

Evaluation Scheme:

No.	Component	Duration	Marks
1.	Internal Assessment		25
	• Quiz		
	• Class Test		
	• Attendance		
	• Assignment		
2.	End Semester Examination	3 hr	75

Details of the Course		
Unit	**Contents**	**Contact Hours**
1	**Introduction:** Block diagram of an electronic communication system, electromagnetic spectrum-band designations and applications, need for modulation, concept of channels and base-band signals. **Amplitude modulation**: Basics of Amplitude Modulation, generation of AM (balanced modulator, collector modulator), Amplitude Demodulation (diode detector), Double side band suppressed carrier, DSBSC generation (balanced modulator), Single side band suppressed carrier, SSBSC generation (filter method, phase cancellation method, Weaver's method), Introduction to other forms of AM (Pilot Carrier Modulation, Vestigial Side Band modulation, Independent Side Band Modulation).	20
2	**Angle modulation:** Frequency and Phase modulation, modulation index and frequency spectrum, equivalence between FM and PM, Generation of FM (direct and indirect methods), FM detector (PLL). Comparison between AM, FM and PM.	14
3	**Transmitters:** Low-level and high-level modulation, AM transmitter, FM transmitter. **Receivers:** Receiver parameters: sensitivity, selectivity and fidelity, AM receiver, FM receiver. **Concept of Noise:** External noise, internal noise, signal to noise ratio, noise factor, noise temperature, Friis formula	10
4	**Pulse Analog Modulation:** Sampling theorem, Pulse Amplitude Modulation (PAM), Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM). Generation and detection of PAM, PWM, PPM signals. **Pulse Code Modulation:** Need for digital transmission, Quantizing, Uniform and Non-uniform Quantization, Quantization Noise, Companding, Coding, Digital Formats. Decoding,	16
	Total	**60**

Suggested Books:

Sl. No.	Name of Authors/Books/Publishers	Year of Publication/Reprint
1.	Electronic communication systems- Kennedy, 3rd edition, McGraw international publications	
2.	Principles of Electronic communication systems – Frenzel, 3rd edition, McGraw Hill	
3.	Communication Systems, S. Haykin, Wiley India	2006
4.	Advanced electronic communications systems – Tomasi, 6th edition, PHI.	

5.	Communication Systems: Analog and Digital-R. P. Singh and S. D. Sapre, Tata McGraw Hill	2007
Mode of Evaluation:	Internal Assessment / End Semester Exam 25/75	

Progress Report:

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1	**Introduction, Amplitude modulation**		Block diagram of an electronic communication system
			Electromagnetic spectrum-band designations and applications,
			Need for modulation, concept of channels and base-band signals.
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			generation of AM (balanced modulator, collector modulator)
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			Double side band suppressed carrier, DSBSC generation (balanced modulator),
			Single side band suppressed carrier,
			SSBSC generation (filter method, phase cancellation method, Weaver‘s method),
			Introduction to other forms of AM (Pilot Carrier Modulation, Vestigial Side Band modulation, Independent Side Band Modulation)
2	**Angle modulation**		Frequency and Phase modulation
			modulation index and frequency spectrum
			equivalence between FM and PM
			Generation of FM (direct methods)
			Generation of FM (indirect methods)
			FM detector (PLL)
			Comparison between AM, FM and PM
3	**Transmitters, Receivers and Concept of Noise**		Low-level and high-level modulation, AM transmitter, FM transmitter.
			Receiver parameters: sensitivity, selectivity and fidelity
			AM receiver, FM receiver
			External noise, internal noise, signal to noise ratio
			noise factor, noise temperature, Friis formula
4	**Pulse Analog Modulation and Pulse Code Modulation**		Sampling theorem, Pulse Amplitude Modulation (PAM),
			Pulse Width Modulation (PWM) and Pulse Position Modulation (PPM).
			Generation and detection of PAM, PWM,

			PPM signals
			Generation and detection of PWM, PPM signals
			Need for digital transmission, Quantizing
			Uniform and Non-uniform Quantization,
			Quantization Noise,
			Companding, Coding, Digital Formats. Decoding