

SUBJECT DESCRIPTION AND OBJECTIVES

SUBJECT DESCRIPTION

An **analog** or **analogue signal** is any continuous signal for which the time varying feature (variable) of the signal is a representation of some other time varying quantity, i.e., analogous to another time varying signal. For example, in an analog audio signal, the instantaneous voltage of the signal varies continuously with the pressure of the sound waves. It differs from a digital signal, in which a continuous quantity is represented by a discrete function which can only take on one of a finite number of values. The term analog signal usually refers to electrical signals; however, mechanical, pneumatic, hydraulic, and other systems may also convey analog signals.

An analog signal uses some property of the medium to convey the signal's information. For example, an aneroid barometer uses rotary position as the signal to convey pressure information. In an electrical signal, the voltage, current, or frequency of the signal may be varied to represent the information.

Data transmission, digital transmission, or digital communications is the physical transfer of data (a digital bit stream) over a point-to-point or point-to-multipoint communication channel. Examples of such channels are copper wires, optical fibres, wireless communication channels, storage media and computer buses. The data are represented as an electromagnetic signal, such as an electrical voltage, radiowave, microwave, or infrared signal.

OBJECTIVES

- Understand analog and digital communication techniques.
- Learn data and pulse communication techniques.
- Be familiarized with source and Error control coding.
- Gain knowledge on multi-user radio communication.
- Apply analog and digital communication techniques.
- Use data and pulse communication techniques.
- Analyze Source and Error control coding.

- Utilize multi-user radio communication.

CS6304 ANALOG AND DIGITAL COMMUNICATION

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UNIT I ANALOG COMMUNICATION

9

Noise: Source of Noise - External Noise- Internal Noise- Noise Calculation. Introduction to **Communication Systems:** Modulation – Types - Need for Modulation. Theory of Amplitude Modulation - Evolution and Description of SSB Techniques - Theory of Frequency and Phase Modulation – Comparison of various Analog Communication System (AM – FM – PM).

UNIT II DIGITAL COMMUNICATION

9

Amplitude Shift Keying (ASK) – Frequency Shift Keying (FSK) Minimum Shift Keying (MSK) – Phase Shift Keying (PSK) – BPSK – QPSK – 8 PSK – 16 PSK - Quadrature Amplitude Modulation (QAM) – 8QAM – 16 QAM – Bandwidth Efficiency– Comparison of various Digital Communication System (ASK– FSK – PSK – QAM).

UNIT III DATA AND PULSE COMMUNICATION

9

Data Communication: History of Data Communication - Standards Organizations for Data Communication- Data Communication Circuits - Data Communication Codes - Error Detection and Correction Techniques - Data communication Hardware - serial and parallel interfaces. **Pulse Communication:** Pulse Amplitude Modulation (PAM) – Pulse Time Modulation (PTM) – Pulse code Modulation (PCM) - Comparison of various Pulse Communication System (PAM – PTM – PCM).

UNIT IV SOURCE AND ERROR CONTROL CODING

9

Entropy, Source encoding theorem, Shannon fano coding, Huffman coding, mutual information, channel capacity, channel coding theorem, Error Control Coding, linear block codes, cyclic codes, convolution codes, viterbi decoding algorithm.

UNIT V MULTI-USER RADIO COMMUNICATION

9

Advanced Mobile Phone System (AMPS) - Global System for Mobile Communications (GSM) - Code division multiple access (CDMA) – Cellular Concept and Frequency Reuse - Channel Assignment and Hand - Overview of Multiple Access Schemes - Satellite Communication - Bluetooth.

TOTAL: 45 PERIODS

TEXT BOOK:

1. Wayne Tomasi, "Advanced Electronic Communication Systems", 6th Edition, Pearson Education, 2009.

REFERENCES:

1. Simon Haykin, "Communication Systems", 4th Edition, John Wiley & Sons, 2004
2. Rappaport T.S, "Wireless Communications: Principles and Practice", 2nd Edition, Pearson Education, 2007
3. H.Taub, D L Schilling and G Saha, "Principles of Communication", 3rd Edition, Pearson Education, 2007.
4. B. P.Lathi, "Modern Analog and Digital Communication Systems", 3rd Edition, Oxford University Press, 2007.
5. Blake, "Electronic Communication Systems", Thomson Delmar Publications, 2002.
6. Martin S.Roden, "Analog and Digital Communication System", 3rd Edition, Prentice Hall of India, 2002.
7. B.Sklar, "Digital Communication Fundamentals and Applications" 2nd Edition Pearson Education 2007.

MICRO LESSON PLAN

WEEK	HOURS	LECTURE TOPIC	BOOK
UNIT I ANALOG COMMUNICATION			
I	1	Noise: Source of Noise	R1
	2	External Noise- Internal Noise	
	3	Noise Calculation	
	4	Introduction to Communication Systems	
	5	Modulation – Types - Need for Modulation	
II	6	Theory of Amplitude Modulation	
	7	Evolution and Description of SSB Techniques	
	8	Theory of Frequency and Phase Modulation	
	9	Comparison of various Analog Communication System (AM – FM – PM).	
UNIT II DIGITAL COMMUNICATION			
III	10	Amplitude Shift Keying (ASK)	T1
	11	Frequency Shift Keying (FSK) -Minimum Shift Keying (MSK)	
	12	Phase Shift Keying (PSK)	
	13	BPSK – QPSK – 8 PSK – 16 PSK -	
	14	Quadrature Amplitude Modulation (QAM)	
IV	15	8QAM – 16 QAM	
	16	Bandwidth Efficiency	
	17	Comparison of various Digital Communication System (ASK– FSK – PSK – QAM).	
	18		
UNIT III DATA AND PULSE COMMUNICATION			
V	19	Data Communication: History of Data Communication	T1
	20	Standards Organizations for Data Communication	
	21	Data Communication Circuits	
	22	Data Communication Codes	
	23	Error Detection and Correction Techniques	
	24		
25	Data communication Hardware - serial and parallel interfaces		
VI	26	Pulse Communication: Pulse Amplitude Modulation (PAM)	
	27	Pulse Time Modulation (PTM)	
	28	Pulse code Modulation (PCM)	
	29	Comparison of various Pulse Communication System (PAM – PTM – PCM).	
UNIT IV SOURCE AND ERROR CONTROL CODING			
VII	30	Entropy	T1
	31	Source encoding theorem	
	32	Shannon fano coding	
VIII	33	Huffman coding	
	34	Mutual information	
	35	Channel capacity	
	36	Channel coding theorem	
IX	37	Error Control Coding, linear block codes	
	38	Cyclic codes, Convolution codes, viterbi decoding algorithm	
	UNIT V MULTI-USER RADIO COMMUNICATION		
X	39	Advanced Mobile Phone System (AMPS)	T1
	40	Global System for Mobile Communications (GSM)	
	41	Code division multiple access (CDMA)	
	42	Cellular Concept and Frequency Reuse	
XI	43	Channel Assignment and Hand	T1
	44		

	45	Overview of Multiple Access Schemes	
	46	Satellite Communication - Bluetooth.	
	47		

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