COURSE TITLE   : DIGITAL COMMUNICATION
COURSE CODE   : 5201
COURSE CATEGORY   : A
PERIODS PER WEEK   : 4
PERIODS PER SEMESTER   : 52/5
CREDITS   : 4

TIME SCHEDULE

MODULE	TOPIC	PERIODS
1	Pulse and Pulse Code Modulation	13
2	Digital Modulation Techniques	13
3	Information Theory and Coding	13
4	Transmission Techniques and Error Control	13
	TOTAL	**52**

Course General Outcome:

MODULE	G.O.	On completion of the study of this course the students will be able:
1	1	To understand different Pulse Modulation Techniques.
	2	To understand Pulse Code Modulation and different PCM Techniques.
2	3	To comprehend Digital Modulation Techniques.
	4	To understand QPSK and MSK.
3	5	To understand the Concept of Information Theory and Requirement for Coding.
	6	To understand the Different Error Detection and Error Correcting Codes.
4	7	To comprehend different Multiplexing and Transmission Techniques.
	8	To understand Error Control Methods and Data security.

On completion of the study of this course the students will be able:

MODULE – I PULSE AND PULSE CODE MODULATION.

1.1.0   To understand Different Pulse Modulation Techniques

     1.1.1   To list the different Pulse Modulation Techniques.
     1.1.2   To explain PAM Modulation and Demodulation.
     1.1.3   To explain PWM Modulation and Demodulation.
     1.1.4   To explain PPM Modulation and Demodulation.
     1.1.5   To compare the different Pulse Modulation Techniques.

1.2.0   To understand Pulse Code Modulation

1.2.1   To describe Sampling Theorem and its significance.
1.2.2   To explain Pulse Code Modulation- Basic elements of PCM.
1.2.3   To explain Quantization.
1.2.4   To know Noise in PCM.
1.2.5   To describe Non Uniform Quantization and Companding.
1.2.6   To explain Differential PCM.
1.2.7   To explain Delta Modulation.
1.2.8   To describe Slope Overload and Granular Noise.
1.2.9   To explain Adaptive Delta Modulation.

MODULE – II : DIGITAL MODULATION TECHNIQUES

2.1.0   To comprehend Digital Modulation Techniques

2.1.1   To know the concept of Band Pass Data Transmission Systems.
2.1.2   To explain BFSK system.
2.1.3   To explain BPSK system and its spectral properties.

2.2.0   To understand QPSK and MSK

2.2.1   To explain QPSK system and its spectrum.
2.2.2   To explain MSK system.
2.2.3   To explain Gaussian Minimum Shift Keying.

MODULE – III : INFORMATION THEORY & CODING

3.1.0   To understand the concept of information Theory and requirement for coding.

3.1.1   To know the terms message and information.
3.1.2   To define Entropy.
3.1.3   To derive the equation for finding Entropy.
3.1.4   To state theorem on Channel Capacity (Shanon Hartley).
3.1.5   To list the requirements for Coding.
3.1.6   To know Coding for Shanon- fano algorithm.

3.2.0   To understand the different Error Detection and Error Correction Codes.

3.2.1   To explain the error detection code-Parity Bit Method.
3.2.2   To explain the Error Detection and Correcting Codes: Hamming Codes, CRC and Convolution Code.
3.2.3   To list Limitations of FEC codes.
3.2.4   To know the Term Burst error.
3.2.5   To describe Block Interleaving & Convolution Interleaving.

MODULE – IV: TRANSMISSION TECHNIQUES AND ERROR CONTROL

4.1.0   To comprehend different Multiplexing and Transmission Techniques

4.1.1   To describe   the concept of TDM and FDM with Simple Block Diagram.
4.1.2   To explain the different Data Transmission Methods- Simplex, Half-duplex, Full duplex.
4.1.3   To Explain Synchronous and Asynchronous Data Transmission.
4.1.4   To explain   switching—Circuit, Message and Packet.

4.2.0   To understand Error Control Methods And Data Security

4.2.1   To describe error controls – Stop and Wait ARQ, Sliding window ARQ , Selective-Reject ARQ.
4.2.2   To describe Data Security.
4.2.3   To know Ciphers
4.2.4   To describe Public-Key Algorithm: RSA
4.2.5   To know Digital Signature.

MODULE – I: Pulse Modulation

Sampling theorem and its significance - Pulse modulation- PAM, PWM, PPM –modulation and demodulation. Model of a Digital Communication system -Basic Elements of PCM—Quantization-- Noise in PCM--Non uniform quantization—Companding Differential PCM-- Delta Modulation--,Noise in Delta Modulation--slope overload and granular noise Adaptive Delta modulation.

MODULE - II : Digital Carrier Modulation

Introduction--Elements of Band Pass Data Transmission system -BFSK- Generation and detection. BPSK- Generation and detection, Spectrum and bandwidth QPSK – Spectrum - MSK- Gaussian Minimum Shift Keying.

MODULE – III : Information Theory & Coding

Message—Information--Finding Entropy--, Channel Capacity - Shanon Hartley theorem-- Need for Coding, Coding requirement-- Shanon Fano algorithm; Error detection-- Parity bit method-- Error detection and correction codes-- Hamming Code,CRC,Convolution Codes-- Limitations of FEC codes- Burst Error Correction-- Block interleaving--Convolution interleaving

MODULE – IV: Transmission Techniques and Error Control

Multiplexing Techniques – FDM, TDM.-- Data Transmission Methods- Simplex, Half-duplex, Full duplex -- Synchronous and asynchronous data transmission-- different switching Error control methods – Stop and Wait ARQ—Sliding window ARQ--Selective-Reject ARQ Advantages- - data security- ciphers- public key algorithm-RSA-Digital signatures.

REFERENCE

1. Principles of Communication systems – Taub and Schilling.
2. Electronics Communication Systems – Wayne Tomasi—Pearson.
3. Data and Computer Communication – William Stallings--Pearson.
4. Communication Systems - Simon Haykin.
5. Electronic Communication system - Roy Blake 2nd Edition, Thomson & Delmar.
6. Principles of Digital communication-J.Das,S.K Mullick,P.K Chatterjee.