**20EC3103 - DIGITAL COMMUNICATION**

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| **Course Category:** | | Program Core | | **Credits:** | 3 |
| **Course Type:** | | Theory | | **Lecture-Tutorial-Practical:** | 2-2-0 |
| **Prerequisite:** | | Random Signals and Stochastic Processes, Signals & Systems, Analog Communication. | | **Sessional Evaluation:**  **External Evaluation:**  **Total Marks:** | 40  60  100 |
| **Course**  **Objectives** | Students undergoing this course are expected to: | | | | |
| 1. Understand basic components of digital communication system. 2. Apply suitable pulse code modulation schemes for various applications. 3. Understand transmission and detection of digital passband modulation schemes. 4. Analyze error performance of a digital communication system in presence of noise and other interferences. 5. Understand various M-ary modulation techniques. 6. Understand various Spread-Spectrum techniques. | | | | |
| **Course Outcomes** | After completing the course, the student will be able to | | | | |
| CO1 | | Illustrate merits and demerits of digital transmission with the help of block diagram. | | |
| CO2 | | Describe each block in PCM with help of digital communication system. | | |
| CO3 | | Acquire knowledge of ISI and Nyquist criterion. | | |
| CO4 | | Discuss the generation and detection of ASK and FSK, BPSK and QPSK schemes. | | |
| CO5 | | Derive equations for error probabilities of BPSK, QPSK, BFSK and BASK Schemes. | | |
| CO6 | | Explain different types of Spread-Spectrum techniques. | | |
| **Course**  **Content**  **Course**  **Content** | **UNIT – I**  **ELEMENTS OF DIGITAL COMMUNICATION SYSTEMS**: Block diagram of Digital Communication System, merits and demerits of digital transmission, Line Coding.  **MULTIPLEXING TECHNIQUES:** FDM, TDM& CDM, Comparison of FDM, TDM and CDM, Digital Multiplexers.  **UNIT – II**  **PULSE CODE MODULATION:** Introduction to PCM, Transmitter and Receiver, Uniform Quantization, Non uniform Quantization, Companding, DPCM Transmitter and Receiver, Delta Modulation Transmitter and Receiver, Adaptive Delta Modulation Transmitter and Receiver, Noise in PCM and DM systems. Comparison of Pulse Code Modulation schemes.  **UNIT – III**  **BASEBAND PULSE TRANSMISSION:** Introduction, Inter-Symbol Interference (ISI), Nyquist Criterion for distortion less baseband binary transmission, Ideal Nyquist Channel, Raised Cosine Filter & its Spectrum, Correlative-Level Coding – Duo binary & Modified Duo binary signaling, Partial-Response signaling, baseband M-array PAM Transmission, Eye Pattern.  **UNIT – IV**  **PASSBAND DATA TRANSMISSION:** Introduction, Passband Transmission Model, generation and detection of Coherent Binary Amplitude Shift Keying (ASK), Binary Phase Shift Keying (BPSK), Quadrature Phase Shift Keying (QPSK) and Binary Frequency Shift Keying (BFSK), Generation and Detection of Non-Coherent BFSK, DPSK, Comparison of BPSK, DPSK QPSK, BFSK & BASK Schemes.  **UNIT – V**  **M-ARY MODULATION TECHNIQUES:** M-ary PSK, M-ary Quadrature Amplitude Modulation (M-ary QAM), Comparison of M-ary Digital Modulation Techniques.  **RECEIVERS:** Matched Filter, Properties of Matched Filter, Matched Filter for Rectangular Pulse, error rate due to noise, error probabilities of BPSK, QPSK, BFSK.  **UNIT – VI**  **SPREAD-SPECTRUM MODULATION:** Introduction, Pseudo Noise Sequences,Direct Sequence Spread-Spectrum, Frequency Hop Spread-Spectrum: Slow frequency hopping, Fast frequency hopping. | | | | |
| **Text Books and Reference Books** | **TEXT BOOKS:**   1. “Communication Systems” , by Simon Haykin - Wiley India Edition, 5th Edition, 2010. 2. “Digital and Analog Communication Systems”, by k.Sam Shanmugam, Wiley -edition, 2019.   **REFERENCE BOOKS:**   1. “Principles of Communication Systems”, by Herbert Taub. Donald L Schilling- Goutam Sana- 4th Edition-McGraw-Hill- 2017. 2. “Communication Systems- Analog & Digital”, by R. P. Singh & S.D. Sapre- T.M.H. Publications. 3rd Edition, 2017. 3. “Digital Communications”,by John G. Proakis. Masoud salehi – 5th Edition-   McGraw-Hill- 2014. | | | | |
| **E-Resources** | 1. <http://www.nptel.ac.in>. 2. http:/www.ebookee.com/digitalcommunicationsystems. | | | | |

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| **Contribution of Course Outcomes towards achievement of Program Outcomes** | | | | | | | | | | | | | | |
|  | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 3 | 3 |
| CO2 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 3 | 2 |
| CO3 | 3 | 3 | 3 | 2 | 1 | 1 | - | - | 1 | - | - | 2 | 2 | 3 |
| CO4 | 3 | 3 | 2 | 2 | 1 | 1 | - | - | - | - | - | 2 | 2 | 3 |
| CO5 | 3 | 3 | 2 | 2 | 1 | 1 | - | - | 1 | - | - | 2 | 3 | 2 |
| CO6 | 3 | 3 | 2 | 2 | 1 | - | - | - | - | - | - | 2 | 3 | 2 |