



The Bombay Salesian's Society's

Don Bosco Institute of Technology

(An Autonomous Institute Affiliated to University of Mumbai)

Department of Electronics and Telecommunication Engineering

Syllabus for IA-1 Examination (Date: 08 to 12 September 2025,
Time : 12:30 pm to 1.30 pm, Maximum Marks: 20, Duration : 60 Minutes)

TE – SEM V

Course Code	Course Name	Faculty Incharge	Syllabus
ECC501	Digital Communication	Ms. Namita Agarwal	<p>Module 1: Information Theory and Source Codes</p> <p>1.1- Block diagram of digital communication system, Information content of a source symbol, Source entropy, Average information rate, AWGN channel, and Shannon-Hartley channel capacity theorem.</p> <p>1.2: Introduction of source code, Huffman code, Shannon-Fano code.</p> <p>Module 2: Error Control System and Error Detection Codes</p> <p>2.1- Introduction of error control system, Automatic Retransmission Query (ARQ) system, Types of ARQ systems and comparison, Forward error correction (FEC) system. Comparison between FEC and ARQ.</p> <p>2.2- Error detection codes: Vertical Redundancy Check (VRC) code, Longitudinal Redundancy Check (VRC) code, Cyclic Redundancy Check (CRC) code and Checksum code.</p> <p>Module 4: Baseband Transmission</p> <p>4.1-Block diagram of baseband transmitter-receiver system, Line codes (RZ and NRZ UniPolar formats, RZ and NRZ Polar formats, NRZ Bipolar format (AMI format), NRZ Manchester format, and Quaternary Polar format). Comparison of line codes with respect to bandwidth, power requirement, synchronization capability, DC level, polarity inversion error and complexity. Power spectral density and spectrum of NRZ Unipolar and Polar formats.</p> <p>4.2: Inter Symbol Interference (ISI), Inter Channel Interference (ICI) Nyquist criterion for distortionless baseband binary transmission, Nyquist bandwidth and practical bandwidth.</p>
ECC502	Discrete Time Signal Processing	Mr. Jayarajesh Vattam	<p>Module 1: Discrete Fourier Transform & Fast Fourier Transform</p> <p>1.1 Discrete Fourier transform (DFT), DFT as a linear transformation, Properties of the DFT, Relationship of the DFT to other transforms, Filtering of long data sequences: Overlap-Save and Overlap-Add Method</p> <p>1.2 Fast Fourier Transform: Radix-2 Fast Fourier Transforms (FFT), Radix-2 decimation in time and decimation in frequency FFT algorithms, Inverse FFT</p> <p>Module 2 : IIR Digital filters</p> <p>2.1: TI systems as frequency-selective filters like low pass, high pass, band pass, notch, comb, all-pass filters, and digital resonators, Analog filter approximations: Butterworth, Chebyshev I, Elliptic.</p> <p>2.2 Mapping from s-plane to the z-plane - impulse invariant and bilinear transformation, Design of IIR digital filters (Butterworth and Chebyshev-I) from analog filters using impulse invariant and bilinear transformation techniques, Analog and digital frequency transformations.</p>

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Course Code	Course Name	Faculty Incharge	Syllabus
ECC503	Digital VLSI	Dr. Sudhakar Mande	<p>Module 1: Review of MOSFET operation and Fabrication 1.1 Overview of VLSI Design Flow, Review of MOSFET operation, MOSFET Capacitances, MOSFET scaling, short channel effects. 1.2 Fabrication process flow of NMOS and CMOS, Lambda based design rules.</p> <p>Module 2: Combinational CMOS Logic Circuits 2.1 CMOS inverter operation, Voltage Transfer characteristics (VTC), Noise Margins, Propagation Delay, Power Dissipation, Design of CMOS Inverter, Layout of CMOS Inverter. 2.2 Realization of CMOS NAND gate, NOR gate, Complex CMOS Logic Circuits, Layout of CMOS NAND, NOR and complex CMOS circuits.</p>
ECC504	Random Signal Analysis	Dr. Revathy Sundarajan	<p>Module 1: Basic Concepts in Probability 1.1: Proof and problems in Total Probability Theorem and Bayes' Theorem</p> <p>Module 3: Operations on one random variable 3.2: Moments: mean and variance 3.3: Characteristic function and MGF</p> <p>Module 4: Multiple random variables and convergence 4.1: Joint, Marginal and Conditional densities 4.2: Correlation and Independence of Random Variables</p> <p>Module 6: Introduction to statistical learning and applications 6.1: Simple Linear Regression</p>

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ECCDLO 5012	Data Structures and Algorithm	Ms. Jayshree Sanap	<p>Module 1 : Introduction to Data Structure & Algorithm 1.1 Introduction to Data Structures, Concept of ADT, Types of Data Structures- Linear and Nonlinear, Operations on Data Structures. 1.2 Algorithm: Performance characteristics of algorithm, Importance of Algorithm Analysis, Complexity of an Algorithm, Introduction to Asymptotic Analysis and Notations. Module 2 : Stack & Queue 2.1 Introduction to Stack, ADT of Stack, Operations on Stack, Array Implementation of Stack 2.2 Applications of Stack- Infix to Postfix Expression Conversion, Infix Expression to Prefix Expression Conversion, Postfix Expression Evaluation 2.3 Introduction to Queue, ADT of Queue, Operations on Queue, Array Implementation of Queue, Types of Queue-Circular Queue, Priority Queue, Introduction to Double Ended Queue 2.4 Applications of various types of Queues Module 3 : Linked List 3.1 Introduction, Linked List v/s Array, Representation of Linked List, Types of Linked List - Singly Linked List, Doubly Linked List 3.2 Operations on Singly Linked List and Doubly Linked List 3.3 Singly Linked List Application-Polynomial Representation and Addition, Doubly Linked List Application</p>
ECCDLO 5015	Sensor Technology	Dr. Ashwini Kotrashetti	<p>Module 1: Introduction Module 1.1 Definition of Sensors, Classification of Sensors Module 1.2 Criteria to choose Sensors Module 1.3 Digital Sensors Module 2: Types of Sensors 2.1 Temperature Sensors 2.2 Proximity Sensors 2.3 Chemical Sensors 2.4 Other Sensors</p>
HCSC501	Cyber security:Ethical Hacking	Ms. Aruna Khubalkar	<p>Module 1:- Introduction to Ethical Hacking Fundamentals of Computer Networks/IP protocol stack, IP addressing and routing, Routing protocol, Protocol vulnerabilities, Steps of ethical hacking Module 2:- Introduction to Cryptography Private-key encryption, public key-encryption, key Exchange Protocols, Cryptographic Hash Functions & applications, steganography, biometric authentication, lightweight cryptographic algorithms.</p>

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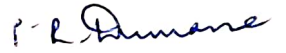
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HAIMLC5 01	AI and ML:Mathematics for AI & ML	Mr. Udaychandra Nayak	Module 1: Linear Algebra Vectors and Matrices, Solving Linear equations, The four Fundamental Subspaces, Eigenvalues and Eigen Vectors, The Singular Value Decomposition (SVD). Module 5: Optimization Types of optimization-Constrained and Unconstrained optimization, Methods of Optimization-Numerical Optimization, Bracketing Methods-Bisection Method, False position Method, Newton's Method, Steepest Descent Method, Penalty Function Method.



Dr. Madhavi S. Pednekar
Head of Department



Ms. Pratibha Dumane
Dean Academics