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**Modern College of Engineering, Pune 05**

**Department of Electronics and Telecommunication Engineering**

**C201: Course Name: Engineering Mathematics III**

On the completion of the course, student will be able to

C201.1	Solve higher order linear Differential equations for various engineering problems like L-C-R electrical circuits.
C201.2	Apply Fourier transform and Z-transform to various engineering problems.
C201.3	Use different Numerical techniques for Differentiation, Integration, and solution of Differential equations.
C201.4	Apply vector differentiation and integration to various vector fields.
C201.5	Analyze conformal mappings, contour integration and transformations of complex functions.

**C202: Course Name: Electronics Circuits**

On the completion of the course, student will be able to

C202.1	Describe MOSFET, its analysis, application such as amplifiers and oscillators.
C202.2	Explain performance of linear and switching regulators with their applications.
C202.3	Explain performance parameters of Op-Amp and its applications.
C202.4	Describe data converters and PLL with their applications.

**C203: Course Name: Digital Circuits**

On the completion of the course, student will be able to

C203.1	Describe various hazards in Digital Logic Families
C203.2	Apply various reduction techniques for digital logic circuit design.
C203.3	Design different Combinational and Sequential Circuits
C203.4	Illustrate Mealy and Moore machines using a state diagram.
C203.5	Implement digital systems using different PLDs

**C204: Course Name: Electrical Circuits**

On the completion of the course, student will be able to

C204.1	Analyze the simple DC and AC circuit with circuit simplification techniques.
C204.2	Calculate transient and steady state response for driven and source free RL, RC and RLC circuits
C204.3	Determine network parameters and network transfer function for given two port network
C204.4	Understand construction, working and applications of DC, AC machines and electrical vehicle using suitable motors



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**C205: Course Name: Data Structures**

On the completion of the course, student will be able to

C205.1	Solve mathematical problems using basic C programming language.
C205.2	Analyze Sorting and Searching algorithms by computing their complexity.
C205.3	Analyze Sorting and Searching algorithms by computing their complexity.
C205.4	Apply the knowledge of Graph and Binary Tree for solving given problems.

**C206: Course Name: Electronic Circuit Lab**

On the completion of the course, student will be able to

C206.1	Demonstrate MOSFET characteristics and its applications by analysis.
C206.2	Verify parameters of linear adjustable voltage regulator for given specifications.
C206.3	Determine Performance parameters of Op-amp and its applications.
C206.4	Evaluate performance of converters and PLL.

**C207: Course Name: Digital Circuits Lab**

On the completion of the course, student will be able to

C207A.1	Implement different Combinational Circuits like Multiplexer and Demultiplexer
C207A.2	Build BCD adder, Subtractor and Comparator
C207A.3	Construct different Sequential Circuits like Shift register and counter
C207A.4	Compare theoretical and practical parameters for TTL and CMOS

**C208: Course Name: Electrical Circuit Lab**

On the completion of the course, student will be able to

C208.1	Analyze the DC circuit by verification of Thevenin's and Norton's Theorem
C208.2	Demonstrate parameters of single phase transformer with the help of standard methods
C208.3	Demonstrate various performance parameters of electrical motors
C208.4	Explain the operation of special purpose motors and drives

**209: Course Name: Data Structures Lab**



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On the completion of the course, student will be able to

C209.1	Solve various problem statements using C programming language.
C209.2	Construct C programs for implementation of linear data structures (Stack, Queue and Linked list).
C209.3	Apply concepts of linear data structure to implement its application.
C209.4	Demonstrate non-linear data structures (tree, graph) for solving given problem using C.

**C210: Course Name: Electronic Skill Development**

On the completion of the course, student will be able to

C210.1	Examine the electronic components using test equipment.
C210.2	Illustrate basic electronics applications using Arduino board
C210.3	Implement electronic circuits using simulation software.
C210.4	Calculate power budget of given electronic circuit.
C210.5	Describe the principles of various batteries and solar power generation system with their applications.

**C211: Course Name: Signals & Systems**

On the completion of the course, student will be able to

C211.1	Perform the classification and different operations of signals
C211.2	Categorize the Systems based on their Input-output relations and Impulse response
C211.3	Obtain the response of LTI Systems using Convolution Integral and Convolution Sum
C211.4	Analyze the signals using Fourier Series, Fourier Transform and Laplace Transform
C211.5	Determine the probability of given event and different statistical parameters of Random Variables

**C212: Course Name: Control Systems**

On the completion of the course, student will be able to



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C212.1	Describe elements of control systems and their modeling using various techniques.
C212.2	Determine the system stability using time and frequency response.
C212.3	Analyze systems using state space representation techniques
C212.4	Explain the role of PID controllers in IOT based industrial automation.

C213: Course Name: **Principles of Communication Systems**

On the completion of the course, student will be able to

C213.1	Describe various parameters (power, BW, energy, PSD) of signals in communication systems
C213.2	Describe the AM and FM systems with mathematical analysis
C213.3	Explain the sampling theorem and various pulse modulation techniques
C213.4	Explain the various Digital Modulation techniques.
C213.5	Describe the techniques of waveform coding, multiplexing and synchronization in baseband digital transmission

C214: Course Name: **Object Oriented Programming**

On the completion of the course, student will be able to

C214.1	Describe the principles of object oriented programming for writing programs using C++.
C214.2	Apply the concept of data encapsulation, data abstraction, constructor and destructor to write program in C++.
C214.3	Demonstrate the concept of operator overloading using member and friend functions in C++.
C214.4	Illustrate the concept of inheritance and dynamic binding using C++.
C214.5	Apply templates, namespaces ,exception and file handling concepts to write programs in C++



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**C215: Course Name: Signals & Control System Lab**

On the completion of the course, student will be able to

C215.1	Plot the signals, magnitude and phase spectrum and aliasing effect.
C215.2	Sketch the response of system to verify commutative property of convolution.
C215.3	Observe the effect of Gibb's Phenomenon.
C215.4	Analyze the system using various Modeling Techniques.
C215.5	Simulate the system to determine stability using time and frequency response.
C215.6	Explain the effect of P, PI, PD and PID controller on the step response

**C216: Course Name: Principle of Communication Systems Lab**

On the completion of the course, student will be able to

C216.1	Demonstrate various modulation techniques.
C216.2	Verify the Sampling Theorem and aliasing effect
C216.3	Demonstrate various line coding techniques and their spectral analysis.
C216.4	Simulate PCM, DM system, sampling of a signal, scrambling and descrambling operation using simulation tool

**C217: Course Name: Object Oriented Programming Lab**

On the completion of the course, student will be able to

C217.1	Write C++ program for the given problem using function and reference variable.
C217.2	Demonstrate classes, objects and operator overloading using C++.
C217.3	Execute programming skills using inheritance in C++.
C217.4	Demonstrate use of namespace, exception and file handling using C++.

**C218: Course Name: - Data Analytics Lab**

On the completion of the course, student will be able to

C218.1	Use different Python packages to handle given data and write program
C218.2	Execute programs for Data Wrangling and Visualization in Python.
C218.3	Demonstrate Exploratory and Statistical Data analysis in Python.
C218.4	Develop a model using linear regression in Python



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219: Course Name: **Employability Skill Development**

On the completion of the course, student will be able to

C219.1	Describe individual skill sets and importance of soft skills
C219.2	Demonstrate good verbal, non-verbal and written communication skills.
C219.3	Employ professional ethics and leadership skills for better employment and teamwork.
C219.4	Apply creative and critical thinking for problem solving.

C220: Course Name: **Project Based Learning**

On the completion of the course, student will be able to

C220.1	Identify interdisciplinary application-based project considering societal and environment context. (Level 1 Remember)
C220.2	Schedule the project work systematically after surveying the literature and finalizing the specifications. (Level 3 Apply)
C220.3	Use appropriate hardware / software tools to design, build, test and analyze the proposed system. (Level 3 Apply)
C220.4	Demonstrate their work with the help of PPT, poster and project report in a team. (Level 3 Apply)

C301: Course Name: Digital Communication



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On the completion of the course, student will be able to

C301.1	Apply the statistical theory for describing various signals and processes in a communication system.
C301.2	Explain various digital modulation techniques and their performance in presence of noise.
C301.3	Describe the digital communication system with spread spectrum modulation.
C301.4	Apply information theoretic approach to analyze a communication system.
C301.5	Use error control coding techniques to improve performance of a digital communication system.

C302: Course Name: **Electromagnetic Field Theory**

On the completion of the course, student will be able to

302.1C	Explain the basic mathematical concepts related to electromagnetic vector fields.
C302.2	Apply the principles of Electrostatic or Magneto static to solve the problems related to the Electromagnetic field.
C302.3	Use the concepts Maxwell's equations to explain time varying electromagnetic field.
C302.4	Analyze the transmission line parameters
C302.5	Explain the behavior of uniform plane wave in different medium
C302.6	Illustrate application of Electromagnetics

C303: Course Name: **Database Management**

On the completion of the course, student will be able to

C303.1	Explain fundamental concepts of database design and ER Model
C303.2	Design Relational Databases using Data Models.
C303.3	Illustrate Database Queries using PL/SQL
C303.4	Describe transaction management and Concurrency control concept
C303.5	Discuss different Database Architectures.



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C304: Course Name: **Microcontrollers**

On the completion of the course, student will be able to

C304.1	Describe the architecture and features of Microcontroller 8051.
C304.2	Develop interfacing of various electronic components/ devices with Microcontroller 8051.
C304.3	Discuss the architecture and features of Microcontroller PIC 18F.
C304.4	Develop interfacing of various electronic components/ devices with Microcontroller PIC 18F.
C304.5	Explain the serial communication details and interfacing with microcontroller 8051 and PIC 18F.

C305A: Course Name: **Fundamentals of JAVA Programming**

On the completion of the course, student will be able to

C305A.1	Describe the basic principles of Java programming language
C305A.2	Apply the concept of data encapsulation, data abstraction, constructor and destructor in Java.
C305A.3	Demonstrate the concepts of Inheritance and dynamic method dispatch.
C305A.4	Use the concept of interfaces & packages for program implementation.
C305A.5	Elaborate multithreading and Exception handling in Java to develop robust programs.
C305A.6	Use Graphics class, AWT packages and manage input and output files in Java .

C305B: Course Name: **Computer Networks**

On the completion of the course, student will be able to

C305B.1	Introduce fundamentals of computer network.
C305B.2	Explain various access control techniques for the data link layer.
C305B.3	Illustrate functions and protocols of the network layer.
C305B.4	Describe various protocols and congestion control techniques for transport layer.
C305B.5	Discuss the use of protocols at the application layer.

C306: Course Name: **Digital Communication Lab**





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On the completion of the course, student will be able to

C306.1	Demonstrate different modulation techniques using hardware setup or simulation tool
C306.2	Demonstrate spread spectrum and multiple access modulation techniques using hardware setup or simulation tool.
C306.3	Simulate random process to verify its statistical parameters
C306.4	Illustrate various Coding Techniques using hardware setup or simulation tool.

**C307: Course Name: Database Management Lab**

On the completion of the course, student will be able to

C307.1	Implement SQL commands for database creation.
C307.2	Execute PL/SQL blocks for different application.
C307.3	Implement database connectivity and navigation operations.
C307.4	Design Database using different phases of software development life cycle for various applications.

**C308: Course Name: Microcontroller Lab**

On the completion of the course, student will be able to

C308.1	Develop program on Memory transfer with microcontroller 8051 in embedded C
C308.2	Demonstrate interfacing of real world devices with 8051 microcontroller in embedded C language using Keil IDE
C308.3	Demonstrate interfacing of real world devices with PIC18F microcontroller in embedded C language using MP-LAB IDE
C308.4	Illustrate serial communication, generation of PWM signal for DC Motor control with PIC 18F microcontroller in embedded C language using MP-LAB IDE



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**C309A: Course Name: Fundamentals of JAVA Programming Lab**

On the completion of the course, student will be able to

C309A.1	Develop basic Java programs.
C309A.2	Demonstrate classes and objects using Java.
C309A.3	Execute programming skills using inheritance in Java.
C309A.4	Use package, exception handling and applet designing with the help of Java.

**C309B Course Name: Computer Networks Lab**

On the completion of the course, student will be able to

C309B.1	Demonstrate installation of LAN and relevant networking devices.
C309B.2	Observe network traffic and different protocols using network simulation and protocol analyzer tools
C309B.3	Implement router using RIP, HTTP & FTP servers using network simulation tool.
C309B.4	Configure different (proxy, web servers) and routers using network simulator.

**C310: Course Name: Skill Development**

On the completion of the course, student will be able to

C310.1	Design an electronic system/sub-system or S/W application for the given specifications.
C310.2	Verify the working of H/W or S/W product by testing / measurement / calibration / troubleshooting / maintenance /installation techniques.
C310.3	Elaborate the various industrial processes of industrial product after industrial visit.
C310.4	Illustrate the product's documentation like SOP, user's manual etc.

**311: Course Name: - Cellular Networks**

On the completion of the course, student will be able to

C311.1	<b>Describe</b> propagation models and estimation techniques of wireless communication systems.
C311.2	<b>Explain</b> OFDM and MIMO-OFDM technologies.(Unit II) (BTL:2).
C311.3	<b>Elaborate</b> fundamental concepts of mobile communication.(Unit III) (BTL:2).
C311.4	<b>Execute</b> wireless-system planning. (Unit IV) (BTL:4).
C311.5	<b>Illustrate</b> wireless network architecture.
C311.6	<b>Identify</b> various performance parameters in wireless communication. .



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**312: Course Name: - Project Management**

On the completion of the course, student will be able to

C312.1	<b>Explain</b> the fundamentals of project management, project identification, project planning, and selection criteria of the project. (BTL-2) (Unit 1,2)
C312.2	<b>Demonstrate</b> the concept of organizational structure within a project and the techniques for effective project scheduling considering resources. (BTL-3) (Unit 3,4)
C312.3	<b>Describe</b> how to handle the risks effectively as well as how to manage finances for the project. (BTL-2) (Unit 5)
C312.4	<b>Discuss</b> the complete product development process and requirements for entrepreneurship along with related legal issues. (BTL-2) (Unit 6)

**313: Course Name: - Power Devices & Circuits**

On the completion of the course, student will be able to

C313.1	<b>Explain</b> different power devices, their construction, characteristics and triggering circuits.
C313.2	<b>Analyze</b> performance of AC voltage controllers, controlled rectifiers, inverters, DC choppers for different loads.
C313.3	<b>Describe</b> working of different resonant converters, protection circuits & EMI minimizing techniques.
C313.4	<b>Elaborate</b> different motor drives, & various power electronics applications like UPS, SMPS, etc.

**314C: Course Name: - Advanced JAVA Programming**

On the completion of the course, student will be able to

C314C.1	<b>Design</b> GUI application using Applet, AWT and Swing.
C314C.2	<b>Apply</b> the concept of AWT /Swing components to handle events.
C314C.3	<b>Demonstrate</b> concept of JDBC (Java Database Connectivity) for database management.
C314C.4	<b>Apply</b> remote method invocation.
C314C.5	<b>Demonstrate</b> client / server communication using Java Networking classes.



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314E: Course Name: - **Network Security**

On the completion of the course, student will be able to

C314E.1	Describe attacks on computers and computer security. (Unit I)
C314E.2	Demonstrate various cryptography techniques.(Unit II)
C314E.3	Illustrate various Symmetric and Asymmetric keys for Cipher text. (Unit III)
C314E.4	Evaluate different Message Authentication Algorithms and Hash Functions (Unit IV)
C314E.5	Explain various aspects of E-Mail Security (Unit V)
C314E.6	Elaborate windows and web browser security using various encryption standards.(Unit VI)

315: Course Name: - **Cellular Networks Lab**

On the completion of the course, student will be able to

C315.1	<b>Examine</b> various performance parameters employing different propagation models.
C315.2	<b>Evaluate</b> BER performance over different channels by varying SNR.
C315.3	<b>Estimate</b> a link budget analysis for wireless communication systems.
C315.4	<b>Analyze</b> performance parameters of cellular systems using different simulation tools.

316: Course Name: - **Power Devices & Circuits Lab**

On the completion of the course, student will be able to

C316.1	<b>Analyze</b> the characteristics of various power devices.
C316.2	<b>Demonstrate</b> power converters with various loads.
C316.3	<b>Describe</b> various protection circuits for power devices and circuits.
C316.4	<b>Demonstrate</b> different motor drives & various power electronics applications like UPS, SMPS, etc.

317C: Course Name: - **Advanced JAVA Programming Lab**

On the completion of the course, student will be able to

C317C.1	Develop Applets in Java.
C317C.2	Demonstrate JDBC programming using Java.
C317C.3	Implement Program in Java for RMI Application.
C317C.4	Demonstrate networking classes using Java.



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317E: Course Name: - **Network Security Lab**

On the completion of the course, student will be able to

C317E.1	Apply Ceaser and Substitution Cipher techniques for encryption and decryption (Expt. No. 2, 3 BTL-3)
C317E.2	Implement Symmetric and Asymmetric key cryptography, Hash functions for encryption. (Expt. No. 5, 6, 7, BTL-2)
C317E.3	Develop the program for Passwords. (Expt. No. 1, BTL-6 )
C317E.4	Explain different wireless network components used in Mobile security apps. (Expt. No. 4, BTL-2)

318: Course Name: - **Internship**

On the completion of the course, student will be able to

C318.1	Apply academic knowledge skillfully in a team.
C318.2	Apply professional and social ethics in working environment.
C318.3	Develop professional competence considering social, economic and administrative aspects.
C318.4	Make use of internship to get sponsored project and placement.
C318.5	Present technical documents based on the internship.
	Plan career goals and personal aspirations.

319: Course Name: - **Mini-project**

On the completion of the course, student will be able to

C319.1	Plan a mini project in a team with step wise execution.
C319.2	Implement electronic hardware by learning PCB artwork design, soldering techniques, trouble shooting and necessary software tools.
C319.3	Prepare a technical report based on the Mini project.
C319.4	Deliver technical seminar based on the Mini Project work carried out.