R.M.D ENGINEERING COLLEGE

(An Autonomous Institution)

B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS – 2017

COURSE OUTCOMES

Course Code	Subject Code	Subject Name
II YEAR		**SEMESTER-III**
C201	MA8352	Linear Algebra and Partial Differential Equations
C202	EC8393	Fundamentals of Data Structures In C
C203	EC8351	Electronic Circuits- I
C204	EC8352	Signals and Systems
C205	EC8392	Digital Electronics
C206	EC8391	Control Systems Engineering
C207	EC8381	Fundamentals of Data Structures in C Laboratory
C208	EC8361	Analog and Digital Circuits Laboratory
C209	HS8381	Interpersonal Skills/Listening &Speaking
II YEAR		**SEMESTER-IV**
C210	MA8451	Probability and Random Processes
C211	EC8452	Electronic Circuits II
C212	EC8491	Communication Theory
C213	EC8451	Electromagnetic Fields
C214	EC8453	Linear Integrated Circuits
C215	GE8291	Environmental Science and Engineering
C216	EC8461	Circuits Design and Simulation Laboratory
C217	EC8462	Linear Integrated Circuits Laboratory
III YEAR		**SEMESTER-V**
C301	EC8501	Digital Communication
C302	EC8553	Discrete-Time Signal Processing
C303	EC8552	Computer Architecture and Organization
C304	EC8551	Communication Networks
C305	EC8073	Medical Electronics

C306	OMD551	Basics of Biomedical Instrumentation
C307	EC8562	Digital Signal Processing Laboratory
C308	EC8561	Communication Systems Laboratory
C309	EC8563	Communication Networks Laboratory
III YEAR		**SEMESTER-VI**
C310	EC8691	Microprocessors and Microcontrollers
C311	EC8095	VLSI Design
C312	EC8652	Wireless Communication
C313	MG8591	Principles of Management
C314	EC8651	Transmission Lines and RF Systems
C315	EC8004	Wireless Networks
C316	EC8681	Microprocessors and Microcontrollers Laboratory
C317	EC8661	VLSI Design Laboratory
C318	EC8611	Technical Seminar
C319	HS8581	Professional Communication
IV YEAR		**SEMESTER-VII**
C401	EC8701	Antennas and Microwave Engineering
C402	EC8751	Optical Communication
C403	EC8791	Embedded and Real Time Systems
C404	EC8702	Adhoc and Wireless Sensor Networks
C405	EC8071	Cognitive Radio
C406	OIC751	Transducer Engineering
C407	EC8711	Embedded Laboratory
C408	EC8761	Advanced Communication Laboratory
IV YEAR		**SEMESTER-VIII**
C409	GE8076	Professional Ethics in Engineering
C410	EC8094	Satellite Communication
C411	EC8811	Project Work

COURSE OUTCOMES

II Year Courses

Course Code: C201 **Subject Code/Name: MA8352 / Linear Algebra and Partial Differential Equations**

Course Outcomes	K-level	Description At the end of this course students will be able to
C201.1	K2	Describe the physical processes as partial differential equations and solve both homogeneous and non-homogeneous equations.
C201.2	K3	Solve Fourier series concept to many applications in engineering.
C201.3	K3	Solve boundary value problems, heat equation and wave equation.
C201.4	K3	Solve definite integrals by using Fourier Transform techniques.
C201.5	K6	Construct Z-transform and find inverse Z-transform techniques for discrete systems.
C201.6	K3	Solve difference equations using Z-transforms.

Course Code: C202 **Subject Code/Name: EC8393 / Fundamentals of Data Structures in C**

Course Outcomes	K-level	Description At the end of this course students will be able to
C202.1	K3	Implement the fundamentals of Object oriented Programming particularly in C++
C202.2	K2	Explain Container classes, Integrators, Proxy Classes & Over loading
C202.3	K2	Explain classes based on Inheritance and Polymorphism
C202.4	K3	Outline the Linear data structures like Linked list, Stack and Queue using Object Oriented Programming
C202.5	K6	Construct nonlinear data structures like Trees and Graphs using Object Oriented Programming
C202.6	K4	Examine the concepts of Searching, Internal and External Sorting Techniques.

Course Code: C203 **Subject Code/Name: EC8351 / Electronic Circuits I**

Course Outcomes	K-level	Description At the end of this course students will be able to
C203.1	K6	Design an amplifier circuits using various biasing method
C203.2	K4	Analyze the single stage and multistage BJT amplifiers using small signal equivalent model
C203.3	K4	Analyze JFET and MOSFET amplifiers using small signal equivalent model
C203.4	K3	Determine the frequency response of single stage and multistage amplifiers
C203.5	K4	Analyze the design of regulated DC power supplies
C203.6	K4	Illustrate Troubleshoot and fault analysis of power supplies

Course Code: C204 **Subject Code/Name: EC8352 / Signals and Systems**

Course Outcomes	K-level	Description At the end of this course students will be able to
C204.1	K2	Examine the operations of signals
C204.2	K3	Solve the Continuous time signals using Transforms
C204.3	K3	Examine the Continuous time LTI systems using Transforms
C204.4	K3	Illustrate the effect of aliasing through Baseband sampling theorem
C204.5	K2	Solve the Discrete time signals using Transforms
C204.6	K2	Demonstrate the Discrete time LTI systems using Transforms

Course Code: C205 **Subject Code/Name: EC8392 / Digital Electronics**

Course Outcomes	K-level	Description At the end of this course students will be able to
C205.1	K2	Realize Boolean expression using logic gates
C205.2	K6	Design Combinational circuits for a given functions using logic gates.
C205.3	K6	Implement synchronous and Asynchronous sequential circuits for a given application.
C205.4	K6	Design the combinational logic circuits using Programmable Logic Devices.
C205.5	K2	Summarize the types of memory devices.
C205.6	K4	Analyze the various logic families and their characteristics.

Course Code: C206 Subject Code/Name: EC8391 / Control Systems Engineering

Course Outcomes	K-level	Description At the end of this course students will be able to
C206.1	K4	Identify the various Control System components and their representations.
C206.2	K3	Analyze the various time domain parameters.
C206.3	K6	Analysis the various frequency response plots and its system.
C206.4	K4	Apply the concepts of various system stability criterions.
C206.5	K6	Design various transfer functions of Control System using State variable models.
C206.6	K4	Analyze the digital Control System using State Feedback

Course Code: C207 Subject Code/Name: EC8381/ Fundamentals of Data Structures in C Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C207.1	K3/K6	Design and implement C++ programs for manipulating stacks.
C207.2	K3/K6	Design and implement C++ programs for manipulating queues.
C207.3	K3/K6	Design and implement C++ programs for manipulating linked list and trees.
C207.4	K3/K6	Design and implement C++ programs for searching algorithms
C207.5	K3/K6	Design and implement C++ programs for different sorting algorithms
C207.6	K3	Implement C++ programs using structures and pointers.
C207.7	K6	Design and implement C++ programs for dynamic memory allocation
C207.8	K3	Implement C++ programs for hash functions, collision resolution technique.
C207.9	K3	Use good programming design method for program development.
C207.10	K6	Use the different data structures for implementing solutions to practical problems.

Course Code: C208 Subject Code/Name: EC8361/ Analog and Digital Circuits Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C208.1	K3/K6	Design of Regulated Power supplies
C208.2	K3/K6	Design frequency Response of CE, CB, CC and CS amplifiers & PSPICE
C208.3	K3/K6	Design Darlington Amplifier
C208.4	K3/K6	Design Differential Amplifiers, its Transfer characteristic, CMRR Measurement
C208.5	K3/K6	Design Cascode / Cascade amplifier & Determination of bandwidth of single stage and multistage amplifiers & PSPICE
C208.6	K3	Analysis of BJT ,FET, MOSFET with Fixed bias and Voltage divider bias using Spice
C208.7	K6	Design and implementation of code converters using logic gates(i) BCD to excess-3 code and vice versa (ii) Binary to gray and vice-versa &
C208.8	K3	Design and implementation of 4 bit binary Adder/ Subtractor and BCD adder using IC 7483
C208.9	K3	Design and implementation of Multiplexer and De-multiplexer using logic gates &Design and implementation of encoder and decoder using logic gates
C208.10	K6	Construction and verification of 4 bit ripple counter and Mod-10 / Mod-12 Ripple counters

Course Code: C209 Subject Code/Name: HS8381/ Interpersonal Skills/Listening &Speaking

Course Outcomes	K-level	Description At the end of this course students will be able to
C209.1	K3/K6	Apply listening skills and respond to them appropriately.
C209.2	K3/K6	Participate in group discussions.
C209.3	K3/K6	Make effective presentations.
C209.4	K3/K6	Participate confidently and appropriately in both formal and informal conversions
C209.5	K2	Examine research papers for understanding of a new field, in the absence of a textbook, to summarize and review them
C209.6	K2	Identify promising new directions of various cutting edge technologies
C209.7	K3	Use the skills in preparing a detailed report describing the project and results
C209.8	K2	Report the idea as an oral presentation before an evaluation committee.

Course Code: C210 Subject Code/Name: MA8451 / Probability and Random Processes

Course Outcomes	K-level	Description At the end of this course students will be able to
C210.1	K2	Discuss the basic concepts of probability and various distributions, their MGF, mean and variance.
C210.2	K2	Describe two dimensional random variables and transform the variable from one domain to another domain.
C210.3	K2	Classify the random processes to solve probability problems.
C210.4	K3	Use correlation and spectral densities which can be applied in several areas of science and engineering.
C210.5	K4	Examine the transfer function and unit impulse response to a system.
C210.6	K4	Examine linear system with random inputs.

Course Code: C211 Subject Code/Name: EC8452/ Electronic Circuits II

Course Outcomes	K-level	Description At the end of this course students will be able to
C211.1	K4	Analyze the different types of feedback amplifier circuits
C211.2	K6	Design the different types of oscillators for given specifications
C211.3	K4	Analyze the performance of various tuned amplifiers
C211.4	K6	Design the different types of wave shaping and multivibrators
C211.5	K2	Summarize the operation of power amplifiers
C211.6	K2	Classify the types of DC converters

Course Code: C212 Subject Code/Name: EC8491/ Communication Theory

Course Outcomes	K-level	Description At the end of this course students will be able to
C212.1	K6	Design AM communication systems
C212.2	K6	Design Angle modulated communication systems
C212.3	K3	Apply the concepts of Random Process to the design of Communication systems
C212.4	K4	Analyze the noise performance of AM and FM systems
C212.5	K2	Discuss about the principles of sampling and quantization
C212.6	K6	Design the PCM Systems

Course Code: C213 **Subject Code/Name: EC8451/ Electromagnetic Fields**

Course Outcomes	K-level	Description At the end of this course students will be able to
C213.1	K3	Demonstrate the understanding of three-dimensional coordinate systems.
C213.2	K4	Analyze fields and potentials due to static charges.
C213.3	K4	Analyze static magnetic fields.
C213.4	K3	Interpret Maxwell's equations in integral, differential and phasor forms and explain their physical meaning
C213.5	K2	Explain electromagnetic wave propagation in lossless and lossy media.
C213.6	K3	Solve simple problems requiring estimation of electric and magnetic field quantities based on the above concepts.

Course Code: C214 **Subject Code/Name: EC8453/ Linear Integrated Circuits**

Course Outcomes	K-level	Description At the end of this course students will be able to
C214.1	K3	Demonstrate the basic building blocks of Op-amp.
C214.2	K6	Design Linear and nonlinear applications using Op-amp.
C214.3	K3	Use analog multiplier IC and PLL for signal processing applications
C214.4	K6	Design ADC and DAC using Op-amp
C214.5	K6	Design Waveform generator circuits using Op-amp and IC555 timer
C214.6	K3	Demonstrate the working special function ICs.

Course Code: C215 **Subject Code/Name: GE8291 / Environmental Science and Engineering**

Course Outcomes	K-level	Description At the end of this course students will be able to
C215.1	K4	Compare the interrelationship between the environment and living organism.
C215.2	K2	Report the environmental pollution related problems.
C215.3	K3	Use natural resources in effective manner without degrading it.
C215.4	K2	Infer about the world food problems and use of food resources efficiently.
C215.5	K3	Implement environmental ethics and laws to protect the environment.
C215.6	K3	Solve the environmental related problems with the help of information technology.

Course Code: C216 **Subject Code/Name: EC8461/**
Circuits Design and Simulation Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C216.1	K3/K6	Design and analysis of Series and Shunt feedback amplifiers-Frequency response, Input and Output impedance.
C216.2	K3/K6	Design and analysis of RC Phase shift oscillator and Wien Bridge Oscillator.
C216.3	K3/K6	Design and analysis of Hartley Oscillator and Colpitts Oscillator.
C216.4	K3/K6	Design and analysis of Single Tuned Amplifierr.
C216.5	K3/K6	Design and analysis of RC Integrator, Differentiator circuits, Clippers and Clampers .
C216.6	K3/K6	Design and analysis of Astable and Monostable multivibrators .
C216.7	K3/K6	Design and simulate Tuned Collector, Twin -T / Wein Bridge Oscillator using Spice
C216.8	K3/K6	Design and simulate Double and Stagger tuned Amplifiers using Spice
C216.9	K3/K6	Design and simulate Bistable Multivibrator and Schmitt Trigger circuit with Predictable hysteresis
C216.10	K3/K6	Design and Simulate Analysis of power amplifier.

Course Code: C217 **Subject Code/Name: EC8462/**
Linear Integrated Circuits Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C217.1	K3	Demonstrate significance of Op-amps and their importance.
C217.2	K3	Use op-amp as Inverting, non-inverting, Differential Amplifiers, Differentiator and Integrator.
C217.3	K6	Design instrumentation amplifier and explain the applications of Instrumentation amplifier.
C217.4	K3	Use op-amp as Low pass, High pass, Band pass filters and explain the frequency response.
C217.5	K3	Use op-amp to generate Sine and Square waveform generators.
C217.6	K3	Use IC555 timer to generate square wave form generators.
C217.7	K3	Use IC565 PLL IC to design Frequency multiplier and demonstrate PLL Characteristics.
C217.8	K6	Design DC power supply circuits using special function ICs.

III Year Courses

Course Code: C301 **Subject Code/Name: EC8501 / Digital Communication**

Course Outcomes	K-level	Description At the end of this course students will be able to
C301.1	K3	Demonstrate the concepts of information theory and coding
C301.2	K4	Compare the various waveform coding techniques
C301.3	K4	Experiment the baseband transmission and reception schemes
C301.4	K2	Illustrate the different digital modulation schemes and equalization techniques
C301.5	K4	Examine the PSD and BER of various digital modulation schemes
C301.6	K3	Implement different error control codes.

Course Code: C302 **Subject Code/Name: EC8553/ Discrete-Time Signal Processing**

Course Outcomes	K-level	Description At the end of this course students will be able to
C302.1	K3	Use DFT for the analysis of digital signals and systems
C302.2	K6	Design IIR digital filters.
C302.3	K6	Design FIR digital filters.
C302.4	K4	Distinguish the effects of finite precision representation on digital filters
C302.5	K3	Interpret the DSP functionalities.
C302.6	K4	Distinguish between fixed and floating point architecture principle.

Course Code: C303 **Subject Code/Name: EC8552 / Computer Architecture and Organization**

Course Outcomes	K-level	Description At the end of this course students will be able to
C303.1	K2	Describe the basic structure and operation of digital computer
C303.2	K4	Experiment the Fixed point and Floating-point arithmetic operations.
C303.3	K3	Demonstrate design of data path unit and control unit for processor.
C303.4	K3	Demonstrate about pipelined control units and various types of hazards in the instructions.
C303.5	K3	Interpret the concept of various memories and interfacing.
C303.6	K2	Summarize the latest advancements in computer architecture

Course Code: C304 **Subject Code/Name: EC8551/ Communication Networks**

Course Outcomes	K-level	Description At the end of this course students will be able to
C304.1	K3	Describe the Internet architecture and link layer services
C304.2	K4	Compare various media access and internetworking protocols
C304.3	K3	Apply various routing protocols and algorithms for a given network along with IP addresses
C304.4	K6	Demonstrate the flow of information from one process to another process in the network
C304.5	K4	Summarize the various congestion control and avoidance mechanisms
C304.6	K4	Discuss the various application layer protocols

Course Code: C305 **Subject Code/Name: EC8073 / Medical Electronics**

Course Outcomes	K-level	Description At the end of this course students will be able to
C305.1	K2	Demonstrate the characteristics of the bioelectric signals.
C305.2	K2	Demonstrate the measurement techniques for various non-electrical parameters.
C305.3	K2	Interpret the working of human assist devices.
C305.4	K2	Demonstrate the operation of diathermy equipment's
C305.5	K2	Interpret the principle of Bio -Telemetry.
C305.6	K2	Discuss the recent trends in diagnosis & Therapy.

Course Code: C306 **Subject Code/Name: OMD551 / Basics of Biomedical Instrumentation**

Course Outcomes	K-level	Description At the end of this course students will be able to
C306.1	K3	Discuss the different bio potential and its propagation
C306.2	K3	Demonstrate the different electrode placements for various physiological recording
C306.3	K6	Design bio amplifier for various physiological recording
C306.4	K3	Interpret various techniques of non-electrical physiological measurements
C306.5	K3	Summarize the different types of bio-chemical electrodes.
C306.6	K3	Demonstrate the different biochemical measurements.

Course Code: C307 **Subject Code/Name: EC8562 / Digital Signal Processing Laboratory**

Course Outcomes	K-level	Description At the end of this course students will be able to
C307.1	K4	Analyze basic signal processing operations
C307.2	K3/K6	Design and implement Linear and circular convolution
C307.3	K3/K6	Design and implement auto correlation and cross correlation
C307.4	K3/K6	Analyze the frequency response of signals using DFT
C307.5	K3/K6	Design and implement FIR and IIR filters.
C307.6	K2	Demonstrate their abilities towards DSP processor-based implementation of DSP systems.
C307.7	K3/K6	Use Finite word length effect on DSP systems.
C307.8	K3/K6	Analyze the architecture of DSP processor.
C307.9	K3	Implement sampling operations in DSP processor
C307.10	K3	Implement adaptive filters for various applications of DSP.

Course Code: C308 **Subject Code/Name: EC8561 / Communication Systems Laboratory**

Course Outcomes	K-level	Description At the end of this course students will be able to
C308.1	K3/K6	Implement Signal Sampling and reconstruction
C308.2	K3/K6	Implement time division multiplexing.
C308.3	K3/K6	Design AM Modulator and Demodulator and FM Modulator and Demodulator
C308.4	K3/K6	Design Pulse Code Modulation and Demodulation and Delta Modulation and Demodulation
C308.5	K3/K6	Implement Line coding schemes
C308.6	K3/K6	Simulate ASK, FSK, BPSK ,DPSK, QPSK and QAM generation schemes
C308.7	K3/K6	Simulate of signal constellations of BPSK, QPSK and QAM
C308.8	K3/K6	Simulate of ASK, FSK and BPSK detection schemes
C308.9	K3/K6	Simulate of Linear Block and Cyclic error control coding schemes
C308.10	K3/K6	Simulate of Convolutional coding scheme

Course Code: C309 **Subject Code/Name: EC8563 / Communication Networks Laboratory**

Course Outcomes	K-level	Description At the end of this course students will be able to
C309.1	K3/K6	Implementation of Error Detection / Error Correction Techniques
C309.2	K3/K6	Implementation of Stop and Wait Protocol and sliding window/Goback-N and selective repeat protocols
C309.3	K3/K6	Implementation of High-Level Data Link Control
C309.4	K3/K6	Implementation of IP Commands such as ping, Traceroute, nslookup,IP address configuration.
C309.5	K3/K6	Implementation of IP address configuration.
C309.6	K3/K6	Create a scenario and study the performance of network with CSMA / CA protocol and compare with CSMA/CD protocols.
C309.7	K3/K6	Design of Network Topology - Star, Bus, Ring
C309.8	K3/K6	Implementation of distance vector routing algorithm,f Link state routing algorithm
C309.9	K3/K6	Execution of Congestion Control Algorithms using NS
C309.10	K3/K6	Implementation of Encryption and Decryption Algorithms using any programming language

Course Code: C310 **Subject Code/Name: EC8681/ Microprocessors and Microcontrollers**

Course Outcomes	K-level	Description At the end of this course students will be able to
C310.1	K2	Interpret the Architecture of 8086 Microprocessor
C310.2	K2	Discuss addressing modes and Instruction set of 8086
C310.3	K2	Recognize the design of I/O and Memory Interfacing Circuits
C310.4	K2	Describe Microprocessors with supporting chips
C310.5	K2	Discuss the Architecture of 8051 Microcontroller
C310.6	K6	Design a microcontroller based system

Course Code: C311 **Subject Code/Name: EC8095 / VLSI Design**

Course Outcomes	K-level	Description At the end of this course students will be able to
C311.1	K2	Realize the concepts of digital building blocks using MOS transistor
C311.2	K3	Design combinational MOS circuits and power strategies
C311.3	K3	Design and construct Sequential Circuits and Timing systems
C311.4	K3	Design arithmetic building blocks and memory subsystems
C311.5	K3	Apply and implement FPGA design flow
C311.6	K4	Apply the design techniques for testability and manufacturability

Course Code: C312 **Subject Code/Name: EC8652 / Wireless Communication**

Course Outcomes	K-level	Description At the end of this course students will be able to
C312.1	K3	Define a wireless channel.
C312.2	K3	Explain the concepts of cellular system
C312.3	K3	Classify multiple access techniques
C312.4	K6	Design and implement various signaling schemes for fading channel
C312.5	K4	Compare multipath mitigation techniques and analyze their performance
C312.6	K2	Discuss various multiple antenna techniques

Course Code: C313 **Subject Code/Name: MG8591 / Principles of Management**

Course Outcomes	K-level	Description At the end of this course students will be able to
C313.1	K2	Explain the Basics of Management
C313.2	K4	Describe the planning process in the organization
C313.3	K3	Recognize the concept of organization
C313.4	K3	Demonstrate the ability to directing, leadership and communicate effectively
C313.5	K3	Examine isolate issues and formulate best control methods.
C313.6	K2	Recognize the Practical Importance of Management Skills

Course Code: C314 Subject Code/Name: EC8651 / Transmission Lines and RF Systems

Course Outcomes	K-level	Description At the end of this course students will be able to
C314.1	K4	Analyze various types of transmission lines and their characteristics
C314.2	K3	Demonstrate the high frequency line, power and impedance measurements.
C314.3	K3	Use smith chart to impart knowledge in impedance matching
C314.4	K3	Demonstrate the basic principles associated with Waveguides.
C314.5	K6	Design of active RF Components.
C314.6	K3	Demonstrate the RF system transceiver Design.

Course Code: C315 Subject Code/Name: EC8004 / Wireless Networks

Course Outcomes	K-level	Description At the end of this course students will be able to
C315.1	K2	Describe the various standards and technologies in wireless LAN
C315.2	K4	Apply packet delivery and routing mechanism used in mobile network layer
C315.3	K3	Compare traditional and classical TCP in the Mobile Transport layer
C315.4	K3	Demonstrate the UMTS terrestrial radio access network
C315.5	K3	Interpret the 4G vision features and challenges
C315.6	K2	Classify different technologies used in 4G network

Course Code: C316 Subject Code/Name: EC8681 / Microprocessors and Microcontrollers Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C316.1	K3/K6	Design and Implement arithmetic operations in 8086.
C316.2	K3/K6	Design and Implement code conversions in 8086
C316.3	K3/K6	Design and Implement floating point operations in 8086.
C316.4	K3/K6	Design and Implement counters, time delay in 8086.
C316.5	K3/K6	Design and Implement traffic light controller interface using 8086.
C316.6	K3/K6	Design and Implement Stepper motor control interface using 8086.
C316.7	K3/K6	Design and Implement keyboard and display interface using 8086.
C316.8	K3/K6	Design and Implement serial and parallel l interface using 8086
C316.9	K3/K6	Design and Implement A/D and D/A using 8086
C316.10	K3/K6	Design and Implement arithmetic, logic operations, and code conversions in 8051.

Course Code: C317 Subject Code/Name: EC8661 / VLSI Design Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C317.1	K3/K6	Design 8 bit adder using HDL and implement in FPGA.
C317.2	K3/K6	Design a multiplier using HDL and implement in FPGA.
C317.3	K3/K6	Design an ALU using HDL and implement in FPGA.
C317.4	K3/K6	Design a universal shift register using HDL and implement in FPGA.
C317.5	K3/K6	Design Finite State Machine (Moore/Mealy) using HDL and implement in FPGA.
C317.6	K3/K6	Design Memories using HDL and implement in FPGA.
C317.7	K3/K6	Design and simulate a CMOS inverter using digital flow.
C317.8	K3/K6	Design and simulate a CMOS Basic Gates & Flip-Flops
C317.9	K3/K6	Design and simulate a 4-bit synchronous counter using a Flip-Flops
C317.10	K3/K6	Design and Simulate a CMOS Amplifiers.

Course Code: C318 **Subject Code/Name: EC8611 / Technical Seminar**

Course Outcomes	K-level	Description At the end of this course students will be able to
C318.1	K4	Examine research papers for understanding of a new field, in the absence of a textbook, to summarize and review them
C318.2	K2	Identify promising new directions of various cutting edge technologies
C318.3	K2	Understand the listening and respond appropriately
C318.4	K3	Make effective interpretations
C318.5	K3	Participate confidently in conversations
C318.6	K6	Manage time efficiently
C318.7	K3	Use the skills in preparing a detailed report describing the project and results
C318.8	K6	Report the idea as an oral presentation before an evaluation committee.

Course Code: C319 **Subject Code/Name: HS8581/ Professional Communication**

Course Outcomes	K-level	Description At the end of this course students will be able to
C319.1	K6	Develop adequate Soft Skills required for the workplace
C319.2	K6	Develop employability and career skills
C319.3	K4	Make effective presentations
C319.4	K4	Participate confidently in Group Discussions.
C319.5	K3	Improve personality development skills for job interviews
C319.6	K3	Function effectively as a member or leader in a diverse team
C319.7	K6	Develop time and career management skills
C319.8	K4	Ability to attend interviews successfully

IV Year Courses

Course Code: C401 Subject Code/Name: EC8701/ Antennas and Microwave Engineering

Course Outcomes	K-level	Description At the end of this course students will be able to
C401.1	K3	Apply antenna parameters to find link power budgets and characterize microwave receivers
C401.2	K3	Determine the radiation parameters of wire and loop antennas
C401.3	K3	Show the performance of aperture and frequency independent antennas
C401.4	K3	Sketch the radiation pattern of uniform and non-uniform arrays
C401.5	K3	Illustrate the working principle of active and passive microwave components
C401.6	K3	Interpret a microwave system given the application specifications

Course Code: C402 Subject Code/Name: EC8751/ Optical Communication

Course Outcomes	K-level	Description At the end of this course students will be able to
C402.1	K3	Demonstrate the basic elements in optical fibers, different modes and configurations.
C402.2	K3	Report the transmission characteristics associated with dispersion and polarization techniques
C402.3	K2	Discuss the characteristics of various fiber optical sources and detectors
C402.4	K3	Explain fiber optic receiver systems, measurements and coupling techniques
C402.5	K3	Realize optical communication systems and its networks
C402.6	K3	Compare the performance of optical networks

Course Code: C403 Subject Code/Name: EC8791/ Embedded and Real time Systems

Course Outcomes	K-level	Description At the end of this course students will be able to
C403.1	K3	Use the concepts of embedded system design process and analysis for developing the solution of engineering problems.
C403.2	K6	Design the embedded system applications using the architecture and programming of ARM processor.
C403.3	K3	Examine the concepts of embedded programming.
C403.4	K6	Develop the task using real time operating systems.
C403.5	K3	Use scheduling algorithms for real time operating systems.
C403.6	K6	Create real time applications using embedded system design concepts.

Course Code: C404 **Subject Code/Name: EC8702 / ADHOC and Wireless Sensor Networks**

Course Outcomes	K-level	Description At the end of this course students will be able to
C404.1	K2	Know the basics of Ad hoc networks and wireless sensor networks
C404.2	K3	Apply this knowledge to identify the suitable routing algorithm based on the network and user requirements
C404.3	K3	Apply the knowledge to identify appropriate physical and MAC layer protocols
C404.4	K2	Understand the transport layer and security issues possible in Ad hoc and sensor networks
C404.5	K2	Be familiar with the OS used in wireless sensor networks and build basic modules
C404.6	K2	Understand the sensor network simulation platforms and tools

Course Code: C405 **Subject Code/Name: EC8071 / Cognitive Radio**

Course Outcomes	K-level	Description At the end of this course students will be able to
C405.1	K2	Explain the concepts of software defined radios
C405.2	K2	Describe the Principles of self-aware cognitive radios
C405.3	K2	Compare various approaches for optimizing radio resources
C405.4	K2	Classify the various networking techniques for cognitive radio
C405.5	K3	Illustrate various security issues in cognitive radio
C405.6	K3	Explain the role of cognitive radio in next generation applications

Course Code: C406 **Subject Code/Name: OIC751 /Transducer Engineering**

Course Outcomes	K-level	Description At the end of this course students will be able to
C406.1	K3	Solve problems pertaining to measurement applications.
C406.2	K3	Select the right transducer for a given application.
C406.3	K2	Discuss static and dynamic characteristics of transducers.
C406.4	K2	Demonstrate different types of resistive transducers and their application areas.
C406.5	K2	Explain different types of capacitive and inductive transducers.
C406.6	K2	Explain Piezoelectric, Hall effect, Magneto elastic, MEMS and Smart transducers.

Course Code: C407 Subject Code/Name: EC8711/ Embedded Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C407.1	K2	Understand the ARM evaluation system
C407.2	K3/K6	Design and implement ADC and DAC interfacing with ARM
C407.3	K3/K6	Design and implement LED and PWM interfacing with ARM
C407.4	K3/K6	Design and implement real-time clock and serial port interfacing with ARM
C407.5	K3/K6	Design and implement keyboard and LCD interfacing with ARM
C407.6	K3/K6	Design and implement EPROM interfacing with ARM
C407.7	K3/K6	Implement Mailbox using ARM
C407.8	K3/K6	Interrupt performance characteristics of ARM and FPGA
C407.9	K3/K6	Interface stepper motor and temperature sensor with ARM
C407.10	K3/K6	Design and implement Zigbee protocol with ARM

Course Code: C408 Subject Code/Name: EC8761/ Advanced Communication Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C408.1	K4/K5	Analyze the performance of optical link by measurement of connector, bending and fiber attenuation losses
C408.2	K4/K5	Analyze the numerical aperture and mode characteristics of the fiber
C408.3	K4/K5	Analyze the DC characteristics of LED and Photo Pin Diode
C408.4	K4/K5	Analyze the Eye pattern ,Pulse broadening of optical fiber and the impact on BER
C408.5	K4/K5/ K6	Estimate the wireless channel characteristics such as fading and Doppler Effect.
C408.6	K3/K5	Analyze the performance of wireless communication systems by synchronization and Equalization Technique
C408.7	K3/K5	Analyze the impact of Pulse shaping, matched filtering, OFDM signal transmission and Reception using Software Defined Radio
C408.8	K3/K5	Evaluate VSWR, Impendence Measurement and Impedance Matching using Microwave System
C408.9	K3/K5/ K6	Estimate the Gunn Diode Directional Coupler, Isolator and Circulator Characteristics
C408.10	K4/K5/ K6	Estimate the Microwave IC-Filter characteristics.

Course Code: C409 Subject Code/Name: GE8076/ Professional Ethics in Engineering

Course Outcomes	K-level	Description At the end of this course students will be able to
C409.1	K6	Formulate awareness on human values and apply ethics in society.
C409.2	K2	Identify an ethical issue and assess variety of moral issues using ethical theories in engineering.
C409.3	K3	Analyze engineering, social experimentation and engineers as responsible experimenters
C409.4	K3	Realize engineers' safety and their responsibilities, professional rights, employee rights, and intellectual property rights.
C409.5	K3	Interpret various types of ethics like business ethics, environmental ethics and computer ethics.
C409.6	K6	Develop engineers as managers, consulting engineers, expert witness and advisors.

Course Code: C410 Subject Code/Name: EC6004/ Satellite Communication

Course Outcomes	K-level	Description At the end of this course students will be able to
C410.1	K2	Understand the satellite's orbits and its trajectories with the definitions of parameters associated with it.
C410.2	K3	Understand principle, working and operation of various sub systems of satellites as well as the earth stations
C410.3	K6	Analyze and design satellite communication links
C410.4	K3	Apply various communication techniques for satellite applications
C410.5	K2	Learn advanced techniques and regulatory aspects of satellite communication
C410.6	K4	Understand the role of satellites in various applications

Course Code: C411 **Subject Code/Name: EC8811 / Project Work**

Course Outcomes	K-level	Description At the end of this course students will be able to
C411.1	K3	Apply engineering knowledge to solve complex engineering problems.
C411.2	K4	Identify the problem statement through literature survey and analyze complex engineering problems.
C411.3	K6	Design a system for the solutions of complex engineering problems.
C411.4	K3/K5	Apply modern tools and analyze the data and results to provide valid conclusions.
C411.5	K3	Apply professional engineering practice to assess societal, health, safety, legal and environmental issues in the proposed project work.
C411.6	K3	Apply the professional ethics principles and function effectively as an individual or leader in diverse teams.
C411.7	K3	Develop presentation and communicate effectively through their project presentation.
C411.8	K3	Apply the management and finance principles to their project work to engage independent and life -long learning.

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B.E. ELECTRONICS AND COMMUNICATION ENGINEERING

REGULATIONS – 2021

COURSE OUTCOMES

Course Code	Subject Code	Subject Name
II YEAR		**SEMESTER-III**
C201	21MA303	Linear Algebra and Partial Differential Equations
C202	21EC301	Signals and Systems
C203	21EC302	Electronic Circuits
C204	21EC303	Digital Electronics
C205	21EC304	Control Systems
C206	21CS202	Python Programming (Lab Integrated)
C207	21EC311	Analog and Digital Circuits Laboratory
C208	21EC312	Foundation Lab on Internet of Things (IoT)
C209	21CS313	Aptitude and Coding Skills - I
II YEAR		**SEMESTER-IV**
C210	21MA402	Probability and Random Processes
C211	21EC401	Communication Systems
C212	21EC402	Microprocessors & Microcontrollers
C213	21EC403	Electromagnetic Fields
C214	21EC404	Linear Integrated Circuits
C215	21GE301	Universal Human Values II –Understanding Harmony
C216	21EC411	Microprocessors & Microcontrollers Laboratory
C217	21EC412	Linear Integrated Circuits Laboratory
C218	21EC413	Mini Project and Industrial Internship
C219	21CS414	Aptitude and Coding Skills - II
III YEAR		**SEMESTER-V**
C301	21EC501	Digital Communication
C302	21EC502	Transmission Lines and waveguides
C303	21EC503	VLSI Design (Lab Integrated)

C304	21EC901	Introduction to Internet of things
C305	21EC902	FPGA Architecture and Applications
C306	21EC903	Computer Networks
C307	21EC511	Communication Systems Laboratory
C308	21EC512	Course based project - I
C309	21CS512	Advanced Aptitude and Coding Skills – I

COURSE OUTCOMES

II Year Courses

Course Code: C201 **Subject Code/Name: 21MA303 / Linear Algebra and Partial Differential Equations**

Course Outcomes	K-level	Description At the end of this course students will be able to
C201.1	K2	Determine the dimension and bases of the vector spaces.
C201.2	K3	Compute the matrix representation of the linear transformation under the given basis.
C201.3	K3	Relate the concept of inner product space in orthogonalization.
C201.4	K3	Compute the solutions of partial differential equations.
C201.5	K6	Utilize the Fourier series for wave equations.
C201.6	K3	Solve difference equations using Z-transforms.

Course Code: C202 **Subject Code/Name: 21EC301 / Signals and Systems**

Course Outcomes	K-level	Description At the end of this course students will be able to
C202.1	K4	Analyze the properties of Signals and Systems.
C202.2	K3	Apply Fourier transform and Laplace transform in Continuous Time signal analysis
C202.3	K4	Analyze Continuous Time LTI systems using Fourier and Laplace transforms.
C202.4	K3	Apply DTFT and Z transform in Discrete Time signal analysis.
C202.5	K4	Analyze Discrete Time LTI systems using DTFT and Z transform.
C202.6	K3	Apply Convolution operation for Continuous and Discrete time systems.

Course Code: C203 **Subject Code/Name: 21EC302/ Electronic Circuits**

Course Outcomes	K-level	Description At the end of this course students will be able to
C203.1	K4	Analyze biasing of BJT and BJT amplifiers
C203.2	K4	Analyze biasing of MOSFET and MOSFET amplifiers.
C203.3	K3	Compute the frequency response of amplifiers.
C203.4	K3	Acquire the knowledge of feedback amplifiers.
C203.5	K3	Acquire the knowledge of oscillators.
C203.6	K3	Illustrate the operation of power amplifiers.

Course Code: C204 **Subject Code/Name: 21EC303 / Digital Electronics**

Course Outcomes	K-level	Description At the end of this course students will be able to
C204.1	K2	Implement Boolean expression using logic gates.
C204.2	K6	Design Combinational circuits for a given function using Logic gates.
C204.3	K6	Implement synchronous and Asynchronous sequential circuits for a given application.
C204.4	K6	Design the combinational logic circuits using Programmable Logic Devices.
C204.5	K2	Summarize the types of memory devices.
C204.6	K4	Analyze the various logic families and their characteristics.

Course Code: C205 **Subject Code/Name: 21EC304 / Control Systems**

Course Outcomes	K-level	Description At the end of this course students will be able to
C205.1	K6	Develop mathematical model of linear mechanical and electrical systems.
C205.2	K3	Summarize the time response analysis of first and second order systems.
C205.3	K2	Determine the applications of P, PI, PID controllers.
C205.4	K4	Analyze the frequency response of open and closed loop systems.
C205.5	K2	Estimate the stability and suitable compensators for the given system.
C205.6	K2	Examine the state variables, controllability and observability of linear and time invariant system

Course Code: C206 Subject Code/Name: 21CS202/ Python Programming (Lab Integrated)

Course Outcomes	K-level	Description At the end of this course students will be able to
C206.1	K6	Implement simple Python programs
C206.2	K3	Develop Python programs using functions.
C206.3	K2	Represent and solve compound data using Python lists, tuples, dictionaries.
C206.4	K4	Implement and perform operations on files, modules and packages.
C206.5	K2	Apply Exceptions, Standard Libraries and IDE for application development.

Course Code: C207 Subject Code/Name: 21EC311 / Analog and Digital Circuits Laboratory

Course Outcomes	K-level	Description At the end of this course students will be able to
C207.1	K4	Analyze the characteristics of basic electronic devices.
C207.2	K4	Analyze the frequency response of the amplifiers.
C207.3	K4	Analyze the feedback amplifiers and oscillators.
C207.4	K3	Simulate frequency response of the amplifiers using spice tool.
C207.5	K3	Simulate frequency response of the oscillators using spice tool.
C207.6	K3	Design and test the digital logic circuits.

Course Code : C208 Subject Code/Name: 21EC312 / Foundation lab on IoT

Course Outcomes	K-level	Description At the end of this course students will be able to
C208.1	K3	Acquire knowledge on Internet of Things and its hardware and software components.
C208.2	K3	Demonstrate to interface I/O devices, sensors & communication modules.
C208.3	K4	Analyze by connecting and exchanging data with other devices and systems over the Internet.
C208.4	K4	Analyze to remotely monitor data and control devices.
C208.5	K4	Analyze the issues involved in the design of IoT application in terms of performance, efficiency and response time.
C208.6	K6	Develop real life IoT based projects.

Course Code : C209 Subject Code/Name: 21CS313 / Aptitude and Coding Skills - I

Course Outcomes	K-level	Description At the end of this course students will be able to
C209.1	K3	Develop vocabulary for effective communication and reading skills.
C209.2	K3	Build the logical reasoning and quantitative skills.
C209.3	K3	Develop error correction and debugging skills in programming.

Course Code: C210 Subject Code/Name: 21MA401 / Probability and Random Processes

Course Outcomes	K-level	Description At the end of this course students will be able to
C210.1	K2	Understand the fundamental knowledge of modern probability theory and standard distributions.
C210.2	K2	Categorize the probability models and function of random variables based on one and two-dimensional random variables.
C210.3	K2	Demonstrate and apply the classification of random processes in engineering disciplines.
C210.4	K3	Apply the concepts of correlation functions and spectral densities.
C210.5	K4	Analyze the response of random inputs to linear time invariant systems.
C210.6	K2	Examine a linear system with random inputs.

Course Code: C211 Subject Code/Name: 21EC401/ Communication Systems

Course Outcomes	K-level	Description At the end of this course students will be able to
C211.1	K4	Compare different Amplitude Modulation Schemes for their efficiency and bandwidth.
C211.2	K6	Summarize the concepts of Angle Modulation Systems.
C211.3	K4	Explain different types of Noise in Communication Systems.
C211.4	K6	Analyze the behavior of a communication system in presence of noise
C211.5	K2	Summarize the principles of Sampling and Quantization.
C211.6	K2	Describe the concepts of Pulse modulation Techniques.

Course Code: C212 Subject Code/Name: 21EC402/ Microprocessors and Microcontrollers

Course Outcomes	K-level	Description At the end of this course students will be able to
C212.1	K3	Acquire knowledge on the architecture of 8086 microprocessor and 8051 microcontroller.
C212.2	K3	Apply programming techniques in developing the assembly language program for microprocessor applications.
C212.3	K4	Analyze various types of interfacing devices with other peripheral devices.
C212.4	K3	Apply programming techniques in developing the assembly language program for microcontroller applications.
C212.5	K6	Design and Construct Memory Interfacing Circuits.
C212.6	K6	Design and construct Microprocessor and Microcontroller based systems.

Course Code: C213 Subject Code/Name: 21EC403/ Electromagnetic Fields

Course Outcomes	K-level	Description At the end of this course students will be able to
C213.1	K3	Demonstrate the understanding of three-dimensional coordinate systems.
C213.2	K4	Analyze fields and potentials due to static charges.
C213.3	K4	Analyze static magnetic fields.
C213.4	K3	Interpret Maxwell's equations in integral, differential and phasor forms and explain their physical meaning
C213.5	K2	Explain electromagnetic wave propagation in lossless and lossy media.
C213.6	K3	Solve simple problems requiring estimation of electric and magnetic field quantities based on the above concepts.

Course Code: C214 **Subject Code/Name: 21EC404/ Linear Integrated Circuits**

Course Outcomes	K-level	Description At the end of this course students will be able to
C214.1	K3	Describe the significance and applications of Integrated Circuits
C214.2	K2	Demonstrate various Mathematical Circuit applications using IC 741.
C214.3	K3	Classify and comprehend the working principle of Data Converters.
C214.4	K4	Apply the Analog Multiplier and Phase Locked Loop for recent applications.
C214.5	K6	Design Waveform Generators using Op-amp circuits and analyze IC 555 Timers.
C214.6	K3	Demonstrate the use of IC regulators and Low dropout regulators for voltage.

Course Code: C215 **Subject Code/Name: 21GE301/ Universal Human Values II –Understanding Harmony**

Course Outcomes	K-level	Description At the end of this course students will be able to
C215.1	K2	Would become more aware of themselves, and their surroundings (family, society, nature)
C215.2	K2	Would become more responsible in life, and in handling problems with sustainablesolutions, while keeping human relationships and human nature in mind.
C215.3	K5	Would have better critical ability
C215.4	K2	Would become sensitive to their commitment towards what they have understood (human values,human relationship and human society).
C215.5	K3	Would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

Course Code: C216 **Subject Code/Name: 21EC411 / Microprocessors and Microcontrollers Laboratory**

Course Outcomes	K-level	Description At the end of this course students will be able to
C216.1	K3	Write ALP Programs for Arithmetic and logical operations.
C216.2	K4	Analyze to interface different I/Os with processor.
C216.3	K4	Analyze waveforms using Microprocessors.
C216.4	K3	Write programs in 8051.
C216.5	K3	Demonstrate to interface different I/Os with Microcontroller.
C216.6	K3	Demonstrate to perform to serial communication between two kits.

Course Code: C217 **Subject Code/Name: 21EC412 / Linear Integrated Circuits Laboratory**

Course Outcomes	K-level	Description At the end of this course students will be able to
C217.1	K4	Analyze operational amplifiers in linear and nonlinear applications.
C217.2	K6	Design Amplifiers, Oscillators, D-A converters using Operational Amplifiers.
C217.3	K6	Design Filters using Op-Amp and performs an experiment on frequency response.
C217.4	K3	Design Voltage Regulators and DC power supply using ICs.
C217.5	K4	Analyze the performance of Filters using PSPICE.
C217.6	K4	Analyze the performance of Multivibrators using PSPICE.

Course Code: C218 **Subject Code/Name: 21EC413 / Mini Project and Industrial Internship**

Course Outcomes	K-level	Description At the end of this course students will be able to
C218.1	K3	Solve the real time problems using hardware, software, Computational tools.
C218.2	K6	Integrate software and the assembled components in the designed PCB.
C218.3	K5	Summarize the knowledge inferred through technical report.
C218.4	K2	Communicate a practical understanding of how a business organization actually operates.
C218.5	K4	Exhibit the ability to effectively work in a professional environment and demonstrate work ethic and commitment in a work-based environment.
C218.6	K5	Reflect on personal and professional development needs and set strategic goals for advancing along an intended career path.

Course Code: C219 **Subject Code/Name: 21EC414 / Aptitude and Coding Skills - II**

Course Outcomes	K-level	Description At the end of this course students will be able to
C219.1	K6	Develop advanced vocabulary for effective communication and reading skills.
C219.2	K6	Build an enhanced level of logical reasoning and quantitative skills.
C219.3	K6	Develop error correction and debugging skills in programming.
C219.4	K3	Apply data structures and algorithms in problem solving

III Year Courses

Course Code: C301 **Subject Code/Name: 21EC501 / Digital Communication**

Course Outcomes	K-level	Description At the end of this course students will be able to
C301.1	K2	Describe the concepts of information theory and coding
C301.2	K4	Compare the various waveform coding techniques
C301.3	K2	Describe the baseband transmission and reception schemes
C301.4	K3	Illustrate the different digital modulation schemes and equalization techniques
C301.5	K3	Determine PSD and BER of various digital modulation schemes
C301.6	K3	Construct different error control codes

Course Code: C302 **Subject Code/Name: 21EC502/ Transmission Lines and Wave Guides**

Course Outcomes	K-level	Description At the end of this course students will be able to
C302.1	K3	Solve transmission line equations and its parameters.
C302.2	K2	Explain signal propagation at Radio frequencies.
C302.3	K3	Illustrate impedance matching by stubs using smith charts.
C302.4	K3	Investigate the field components of TE, TM, TEM waves in Parallel planes.
C302.5	K2	Examine the field components of TE, TM waves in Rectangular and Circular waveguides.
C302.6	K2	Discuss the principle of cavity resonators.

Course Code: C303 **Subject Code/Name: 21EC503 / VLSI Design (Lab integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C303.1	K2	Understand the fundamental principles of VLSI circuit design in digital domain
C303.2	K4	Realize the combinational circuits using different logic families
C303.3	K2	Understand the memory design in sequential logic circuits
C303.4	K4	Analyze the architectural choice and performance tradeoff involved in data path unit design.
C303.5	K2	Understand the different FPGA architectures and its testing
C303.6	K6	Design, Simulate to verify the functionality of logic modules using EDA tools and familiarize fusing of logical modules on FPGAs

Course Code: C304 Subject Code/Name: 21EC901/ Introduction to Internet of things

Course Outcomes	K-level	Description At the end of this course students will be able to
C304.1	K1	Identify IoT enabling technologies.
C304.2	K3	Discover different IoT Architecture.
C304.3	K2	Understand communication, network and security protocols
C304.4	K6	Develop IoT based applications with Raspberry Pi
C304.5	K4	Infer the applications of IoT in Real-world scenario.
C304.6	K3	Discover the advancements of IoT in various sectors

Course Code: C305 Subject Code/Name: 21EC902 FPGA Architecture and Applications

Course Outcomes	K-level	Description At the end of this course students will be able to
C305.1	K3	Discover FPGA Design flow
C305.2	K4	Realize and design the finite state machines
C305.3	K6	Develop VHDL/Verilog models and synthesize targeting for Virtex, Spartan FPGAs
C305.4	K4	Analyze various FPGA routing architectures
C305.5	K2	Understand the widespread implementation of FPGAs using short case studies
C305.6	K2	Distinguish the architectural and resource difference between Altera and Xilinx

Course Code: C306 Subject Code/Name: 21EC902/ Computer Networks

Course Outcomes	K-level	Description At the end of this course students will be able to
C306.1	K2	Identify the components required to build different types of networks
C306.2	K3	Choose the required functionality at each layer for given application
C306.3	K2	Identify solution for each functionality at each layer
C306.4	K4	Trace the flow of information from one node to another node in the network
C306.5	K2	Understand and differentiate the various unicast and multicast protocols for routing data
C306.6	K2	Quote the various utilities of the application layer and identify its functionalities

Course Code: C307 **Subject Code/Name: 21EC511 / Communication Systems Laboratory**

Course Outcomes	K-level	Description At the end of this course students will be able to
C307.1	K3	Practice Analog Modulation techniques.
C307.2	K3	Implement sampling theorem and Time Division Multiplexing
C304.3	K4	Analyze the characteristics of Digital Modulation techniques.
C307.4	K3	Demonstrate different Line Coding Schemes.
C307.5	K3	Simulate Various Digital modulation Schemes.
C307.6	K4	Test Error Control Coding Schemes in Communication System.

Course Code: C308 **Subject Code/Name: 21EC512/ Course based project - I**

Course Outcomes	K-level	Description At the end of this course students will be able to
C308.1	K3	Develop their Intellectual skills to understand concepts, rules or procedures.
C308.2	K3	Develop their cognitive strategy to think, organize, learn and behave.
C308.3	K3	Demonstrate the ability to provide conceptual design strategies for a product.
C308.4	K2	Describe procedure for designing of prototype.
C308.5	K2	Recognize interdisciplinary strategies for solving complex problems.
C308.6	K3	Apply integrative strategies for solving complex problems.

Course Code: C309 **Subject Code/Name: 21CS512/ Advanced Aptitude and Coding Skills – I**

Course Outcomes	K-level	Description At the end of this course students will be able to
C309.1	K3	Develop vocabulary for effective communication and reading skills.
C309.2	K3	Build the logical reasoning and quantitative skills.
C309.3	K3	Develop error correction and debugging skills in programming.

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REGULATIONS – 2022

COURSE OUTCOMES

Course Code	Subject Code	Subject Name
II YEAR		**SEMESTER-III**
C201	22EC303	Electromagnetic fields and Transmission lines
C202	22GE201	Tamils and Technology
C203	22MA302	Statistics and Linear Algebra (Lab Integrated)
C204	22EC301	Signals and Systems (Lab Integrated)
C205	22EC302	Analog Electronics (Lab Integrated)
C206	22CS305	Problem solving and Python Programming (Lab Integrated)
C207	22CS313	Aptitude and Coding Skills - I
C208	22EC311	Product Development Lab - 3
II YEAR		**SEMESTER-IV**
C209	22MA401	Probability and Random Processes (Lab Integrated)
C210	22EC401	Control Systems Engineering (Lab Integrated)
C211	22EC402	Linear Integrated Circuits (Lab Integrated)
C212	22EC403	Analog and Digital Communication (Lab Integrated)
C213	22CS411	Aptitude and Coding Skills II
C214	22EC411	Product Development Lab - 4
C215	22EC412	Testing of sensors and actuators

COURSE OUTCOMES

II Year Courses

Course Code: C201 **Subject Code/Name: 21EC303 / Electromagnetic Fields andTransmission Lines**

Course Outcomes	K-level	Description At the end of this course students will be able to
C201.1	K2	Compute electric fields and potentials due to static charges.
C201.2	K3	Illustrate static magnetic fields, magnetic potential and its applications.
C201.3	K2	Interpret Maxwell's equations in integral, differential and phasor forms and explain their physical meaning.
C201.4	K3	Solve transmission line equations and its parameters.
C201.5	K2	Explain standing wave ratio and input impedance in high frequency transmission lines.
C201.6	K4	Analyze impedance matching by stubs using smith charts and MATLAB programming.

Course Code: C202 **Subject Code/Name: 22GE201 / Tamils and Technology**

Course Outcomes	K-level	Description At the end of this course students will be able to
C202.1	K2	Identify the role of weaving and ceramic technology in ancient Tamil Culture.
C202.2	K3	Assess the design and construction technology ideas in the current Tamil society.
C202.3	K2	Identify the different types of manufacturing technology used in Tamil society and their significance.
C202.4	K2	Classify agricultural and irrigation technologies in ancient Tamil society and its current relevance
C202.5	K2	Discuss the fundamentals of scientific Tamil and Tamil computing.
C202.6	K2	Identify the role of weaving and ceramic technology in ancient Tamil Culture.

Course Code: C203 **Subject Code/Name: 22MA302 /Statistics and Linear Algebra (Lab integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C203.1	K4	Apply the concept of testing of hypothesis.
C203.2	K2	Demonstrate the different types of experimental designs.
C203.3	K3	Interpret the control charts for variables and attributes.
C203.4	K2	Identify the bases and dimensions.
C203.5	K2	Find the eigenvalues and eigenvectors using linear transformations

Course Code: C204 **Subject Code/Name: 22EC301/ Signals and Systems (Lab Integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C204.1	K2	Interpret the properties of Signals and Systems.
C204.2	K6	Determine Fourier series, Fourier transform and Laplace transform of Continuous Time signals.
C204.3	K4	Examine Continuous Time LTI systems using Fourier and Laplace transforms.
C204.4	K3	Employ DTFT and Z transform in Discrete Time signal analysis.
C204.5	K4	Examine the Discrete time LTI systems using DTFT and Z transform.
C204.6	K3	Demonstrate Convolution operation for Continuous and Discrete time systems.

Course Code: C205 **Subject Code/Name: 22EC302/ Analog Electronics (Lab Integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C205.1	K6	Design simple electronic circuits based on transistors
C205.2	K6	Design a BJT and MOSFET amplifier for the given specifications and analyze itsfrequency response.
C205.3	K3	Construction of feedback amplifier and oscillator circuit for the given specifications
C205.4	K4	Distinguish different classes of power amplifiers and employ it.
C205.5	K2	Understand the contemporary issues related to analog electronic circuits.
C205.6	K6	Design, simulation, modelling and hardware implementation of analog circuits with discrete components

Course Code: C206 **Subject Code/Name: 22CS305 / Problem-Solving and Python Programming (Lab Integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C206.1	K3	Implement simple Python programs.
C206.2	K6	Develop Python programs using functions.
C206.3	K2	Represent and solve compound data using Python lists, tuples, dictionaries.
C206.4	K3	Implement and perform operations on files, modules and packages.
C206.5	K3	Apply Exceptions, Standard Libraries and IDE for application development.

Course Code: C207 **Subject Code/Name: 22CS311 / Aptitude and Coding Skills - I**

Course Outcomes	K-level	Description At the end of this course students will be able to
C207.1	K6	Develop vocabulary for effective communication and reading skills.
C207.2	K6	Build the logical reasoning and quantitative skills.
C207.3	K6	Develop error correction and debugging skills in programming.

Course Code: C208 **Subject Code/Name: 22EC311/ Product Development Lab - 3**

Course Outcomes	K-level	Description At the end of this course students will be able to
C208.1	K6	Develop their intellectual skills for understanding the concepts, rules or procedures.
C208.2	K6	Develop their cognitive strategy to think, organize, learn and behave.
C208.3	K3	Demonstrate the ability to provide conceptual design strategies for a product
C208.4	K2	Describe procedure for designing a prototype
C208.5	K2	Recognize interdisciplinary strategies for solving complex problems.
C208.6	K3	Apply integrative strategies for solving complex problems

Course Code: C209 **Subject Code/Name: 22MA401 / Probability and Random Processes (Lab Integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C209.1	K3	Calculate the statistical measures of standard distributions.
C209.2	K3	Compute the correlation & regression for two dimensional random variables.
C209.3	K2	Find the steady state probabilities of the Markov chain.
C209.4	K2	Estimate the auto correlation and its power spectral densities of the random Processes
C209.5	K3	Determine the output power spectral density of linear system with random inputs.

Course Code: C210 **Subject Code/Name: 22EC401 / Control Engineering (Lab Integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C210.1	K6	Develop mathematical model of linear mechanical and electrical systems
C210.2	K6	Model the time response analysis of first and second order systems.
C210.3	K4	Analyze the frequency response of open and closed loop systems
C210.4	K6	Design the compensators for Linear Systems
C210.5	K3	Analyze stability methods for Linear Systems.
C210.6	K2	Examine the state variables, controllability and observability of linear and time invariant systems

Course Code: C211 **Subject Code/Name: 22EC402 / Linear Integrated Circuits (Lab Integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C211.1	K2	Express the AC and DC characteristics of Op-amp with its compensation techniques.
C211.2	K2	Elucidate the functions of Op-amp in linear and nonlinear applications.
C211.3	K3	Classify and comprehend the working principle of data converters
C211.4	K2	Illustrate the function of application specific ICs such as, Analog Multiplier, PLL and its applications.
C211.5	K4	Comprehend the effect of voltage regulators in power supply..
C211.6	K6	Design and evaluate various waveform generator circuits using Op-amp.

Course Code: C212 **Subject Code/Name: 22EC403 / Analog and Digital Communication (Lab Integrated)**

Course Outcomes	K-level	Description At the end of this course students will be able to
C212.1	K4	Compare the Spectral efficiency of various Amplitude Modulation Schemes.
C212.2	K2	Summarize the concepts of Generation and Detection of Frequency Modulation
C212.3	K3	Demonstrate the performance of various Pulse coding Techniques.
C212.4	K2	Differentiate the different pass band transmission schemes.
C212.5	K3	Construct different Source and Error control codes
C212.6	K3	Implement different Digital modulation schemes and coding techniques using simulation software

Course Code: C213 **Subject Code/Name: 22CS411 / Aptitude and Coding skills – II**

Course Outcomes	K-level	Description At the end of this course students will be able to
C213.1	K6	Develop advanced vocabulary for effective communication and reading skills.
C213.2	K6	Build an enhanced level of logical reasoning and quantitative skills
C213.3	K6	Develop error correction and debugging skills in Programming.
C213.4	K3	Apply data structures and algorithms in problem solving.

Course Code: C214 **Subject Code/Name: 22EC411 / Product development Lab - 4**

Course Outcomes	K-level	Description At the end of this course students will be able to
C214.1	K2	Understand and explain the real time problems through literatures
C214.2	K4	Analyze the methods to develop solution to the systems.
C214.3	K3	Classify, compare and analyze business opportunities for a new product.
C214.4	K2	Summarize and prepare reports for the experimental determinations
C214.5	K5	Evaluate the performance and effectiveness of the existing problems.
C214.6	K6	Develop life-long learning skills for a productive career.

Course Code: C215 **Subject Code/Name: 22EC412/Testing of Sensors andActuators**

Course Outcomes	K-level	Description At the end of this course students will be able to
C215.1	K2	Describe the fundamental principles and features of the sensors
C215.2	K6	Test the sensors functionality with the Sensor Diagnostic tool.
C215.3	K6	Validate the effect of failed sensors and actuators in engine.
C215.4	K5	Grade the effective use of the tools.