Department of Electronics & Communication Engineering

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MATHEMATICS –III (RAS-301): C-201 **Year of Study: 2018-19**

C-201.1	To solve complex variable problems related to the field of fluid mechanics, fluid dynamics and electric field. Students will able to identify and formulate the problems related to Electronics.
C-201.2	To analyze the data finding their moments, their frequency distribution, best fitting the curve in experimental data.
C-201.3	To use the probability distribution in the form of Binomial, Poisson and Normal distribution in industrial application.
C-201.4	To use the hypothesis testing in the field of Engineering, Medicine, agriculture etc.
C-201.5	To find the solution of algebraic as well as transcendental equations using various using Bisection, Newton Raphson Method, Regular False methods as well as interpolating techniques.

NETWORK ANALYSIS &SYNTHESIS (REE-305): C-202 **Year of Study: 2018-19**

C-202.1	Students will be able to identify and formulate electronics problem by using the concept of signals.
C-202.2	The students will be able to analyze the electric networks using network theorems, system functions, step and impulse response, convolution integral, amplitude and phase response.
C-202.3	The students will be able to solve the electric networks using the concept of graph theory and also determine the stability using Routh Hurwitz criterion.
C-202.4	The students will be able to analyze the electric networks using two port parameters.
C-202.5	The students will be able to synthesize simple RC& LC networks and operational amplifier based active networks.

ELECTRONIC DEVICES AND CIRCUITS (REC-302): C-203 **Year of Study: 2018-19**

C-203.1	Understand the internal structure of semiconductor material and the flow of current in junction under different bias condition.
C-203.2	Explain the working of different Opto electronic devices like photo diode, LED, solar cell.
C-203.3	Analyze transistor and MOSFET amplifier at low and high frequency and determine gain and impedance (I/P, O/P).
C-203.4	Evaluate the performance of different feedback topologies.
C-203.5	Design the different type of LC and RC oscillators.

SIGNALS AND SYSTEMS (REC-303): C-204 **Year of Study: 2018-19**

C-204.1	To understand the types of signals and systems, time scaling & shifting correlation of energy and power signals.
C-204.2	To characterize LTI systems and determine energy and power spectral density also analyze the first & second order systems
C-204.3	To determine Fourier transforms for continuous-time and discrete-time signals and their applications in engineering problems.
C-204.4	Understand the combined implications of the Laplace and Z transform domains and the Regions of convergence (ROC) and their applications in engineering problems.
C-204.5	Understand the sampling theorem, frequency domain representation of sampling and reconstruct band limited signals from its samples.

DIGITAL LOGIC DESIGN (REC-301): C-206 **Year of Study: 2018-19**

C-206.1	To be able to understand numeric information in different forms Binary, BCD, 1's & 2's complements hamming code and also represent digital function in SOP/POS forms.
C-206.2	To be able to analyze and design combinational circuits using MUX, Decoder, and DeMUX.
C-206.3	To be able to analyze and design counters (synchronous and asynchronous) and shift registers using different types of Flip-Flops.
C-206.4	To be able to analyze and design synchronous and asynchronous sequential circuits using Flip-Flops and also determine the hazards and make the hazard free circuit.
C-206.5	To be able to apply acquired knowledge to implements digital circuits using memory devices: ROM, RAM, PROM, PLD etc. also understand the concept of logic families, fan out/fan in, nose margin.

UNIVERSAL HUMAN VALUES & PROFESSIONAL ETHICS (RVE-401): C-207 Year of Study: 2018-19

C-207.1	To discuss a holistic vision towards life through Self Exploration and to appreciate the essential complementarities between Values & Skills ensuring sustained happiness and prosperity, the core aspirations of all human beings.
C-207.2	To understand human being as a co-existence of the sentient "I" and the material "Body" and the correct appraisal of Physical Needs and the meaning of prosperity in detail.
C-207.3	To interpret 9 feelings (values) in relationship to ensure justice and to make programs to achieve comprehensive human goals like- Education-Right Understanding, Health-Education, Justice-Preservation, Production-Work and Exchange-Storage, leading towards an Undivided Society ("Akhand Samaj").
C-207.4	To relate and visualize interconnectedness and mutual fulfillment among the four orders of nature, recyclability and self-regulation in nature.
C-207.5	To acquire competence in professional ethics. Ability to identify and develop more people and eco-friendly appropriate technologies and management patterns.

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ELECTRONICS WORKSHOP & PCB LAB (REC-354): C-210 **Year of Study: 2018-19**

C-210.1	Students able to identify the active and passive components and to measure the voltage current frequency using multimeter and CRO.
C-210.2	Design of step down transformer of 5KVA and test its performance.
C-210.3	Students able to make art work, positive/negative film, and draw it on PCB using UV exposure of the given circuit (5 V power supply).
C-210.4	Students able to etch & drill the PCB and solder the components on PCB for the given circuit (5V power supply).
C-210.5	Test and measure the performance of the soldered PCB and fit the manufactured PCB in cabinet with knobs.

DIGITAL LOGIC DESIGN LAB (REC-351): C-211 **Year of Study: 2018-19**

C-211.1	To verify the truth table of various logic gates.
C-211.2	Students will be able to implement the combinational circuits in SOP/POS forms using NAND/NOR gates and verify their truth table.
C-211.3	Able to implement and design digital combinational circuits like decoders, encoders, multiplexers, and de-multiplexers including arithmetic circuits (half adder, full adder, multiplier).
C-211.4	Able to analyze implement sequential digital circuits like flip-flops, registers, counters.
C-211.5	Design and implements the digital circuits using memory devices: ROM, RAM, PROM, PLD etc. Also verify the truth table the circuits.

ELECTRONICS DEVICES AND CIRCUITS LAB (REC-352): C-212 **Year of Study: 2018-19**

C-212.1	Students able to identify the active and passive components and to measure the voltage current frequency using multimeter and CRO.
C-212.2	Able to plot the I-V characteristics of two terminal devices (Diode, Zener Diode, LED) and compare with theoretical characteristic.
C-212.3	Able to plot the characteristics of three terminal devices (BJT, JFET and MOSFET) and compare with theoretical characteristic and measure their parameters.
C-212.4	Able to analyse the o/p wave form and measure parameters of electronic circuits (Rectifiers, Clipper, Clamper, Filters) and compare with theoretical values.
C-212.5	Able to analyze the o/p wave form and measure parameters of BJT CE amplifier, Op Amp and wein bridge oscillator.

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DATA STRUCTURE & ALGORITHMS (RCS-406): C-221 **Year of Study: 2018-19**

C-221.1	To understand the major algorithms and data structures
C-221.2	To test and compare the performance of algorithms.
C-221.3	To emphasize on right algorithm selection and choose the appropriate data structure and algorithm design method for a specified application
C-221.4	To understand and determine which algorithm or data structure to be use in different scenarios
C-221.5	To develop algorithms using recursive methods and properties of various data structures such as stacks, queues, lists, trees and graphs.

ELECTRONIC MEASUREMENTS & INSTRUMENTATION (REC-403): C-223 Year of Study: 2018-19

C-223.1	Identify the different measurement standards, systems and Errors in an electronic measurement system
C-223.2	Describe different types of Analog and digital voltmeter and ammeter.
C-223.3	Analyze different types of DC and AC bridges
C-223.4	Evaluate voltage, frequency and phase using CRO and DSO and compare the analog & digital CRO.
C-223.5	Compare different type of Calibration methods and recorders.

ELECTROMAGNETIC FIELD THEORY (REC-402): C-224 **Year of Study: 2018-19**

C-224.1	Apply vector calculus to static electro-magnetic fields in different engineering field and situations.
C-224.2	Understand Maxwell's equations in differential and integral forms and apply them to various diverse engineering problems.
C-224.3	Examine the phenomenon in wave propagation in different media and its interfaces and in applications of microwave engineering.
C-224.4	Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications.
C-224.5	Evaluate the Time – varying fields, Poisson's and Laplace' equations and remember the use of them.

DATA STRUCTURE & ALGORITHMS LAB (RCS-456): C-225 **Year of Study: 2018-19**

C-225.1	To design and analyze simple linear and nonlinear data structures
C-225.2	To identify and apply the suitable data structure for the given real world problem
C-225.3	To Gain knowledge in practical applications of data structures
C-225.4	Be able to design and analyze the time and space efficiency of the data structure
C-225.5	Demonstrate familiarity with major algorithms and data structures and Analyse performance of algorithms

ELECTRONICS MEASUREMENT & INSTRUMENTATION LAB (REC-453): C-228 **Year of Study: 2018-19**

C-228.1	To measure average voltage using AC voltmeter.
C-228.2	To perform experiment on LCR bridge and determine its component values and to measure low resistance using Kelvin's double bridge.
C-228.3	To measure the % distortion of a given oscillator using distortion factor meter.
C-228.4	To identify the different transistor terminals using open circuit and short circuit test.
C-228.5	To measure the phase difference and frequency of two different signals using Lissajous pattern.

SIGNALS AND SYSTEMS LAB (REC 353) C-233 **Year of Study: 2018-19**

C-233.1	Understand the basic concepts of matrices , Boolean algebra and logical operation to use MATLAB
C-233.2	Analyze basic function (step, impulse, ramp etc.) using MATLAB.
C-233.3	Student must be able analyze signals in order to understand their time-domain behavior and calculate their frequency spectra using MATLAB.
C-233.4	Ability to analyze systems in order to calculate, estimate and classify their impulse, step and frequency response using MATLAB.
C-233.5	Ability to apply difference equations and the Z-transform in calculating the output of a digital system for given digital input.

ENVIRONMENT & ECOLOGY (RAS-402) C-240 **Year of Study: 2018-19**

C-240.1	To discuss basic knowledge about Environment, Ecosystems and its balance and the need for mass awareness.
C-240.2	To explore and understand about Human Activities-Food, Shelter, Socio-Economic Developments and their impacts on environment.
C-240.3	To analyze Sustainable Development and relevance of Environment Impact Assessment of developmental projects.
C-240.4	To interpret knowledge of Natural Resources- Forest, Water, Mineral, Land and Energy Resources.
C-240.5	To relate and understand Environmental Changes (POLLUTIONS) and Human Health and to acquire the sense of Environmental Protection through Legislations and Education.

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MICROPROCESSORS & MICROCONTROLLERS (REC 401) C-241 Year of Study: 2018-19

C-241.1	Will acquire knowledge about 8085 Microprocessor & its architecture, evolution.
C-241.2	Develop assembly language programme with the use of interfacing devices DMA controller, timer in real time applications, memory, PPI, PIC for a given problem.
C-241.3	Understand and apply the fundamentals of microcontroller, its architecture and registers to write program for various microcontroller based applications in C language.
C-241.4	Student will be able to use on-chip peripherals like timers, ADC for a given problem.
C-241.5	Student will be able to use various Serial communication protocols like UART, SPI for chip to chip communication.

LASER SYSTEM & APLLICATION (REC 043) C-242 Year of Study: 2018-19

C-242.1	To understand the principles of laser action and the properties of laser light.
C-242.2	To understand the operations of different types of lasers.
C-242.3	To explain how material processing is accomplished with lasers.
C-242.4	To understand the basic elements of fiber optic communication systems.
C-242.5	To understand holography and its applications and metrological applications of laser.

MICROPROCESSORS & MICROCONTROLLERS LAB (REC 451) C-243 Year of Study: 2018-19

C-243.1	Students will be able to load, execute and test a program on 8085 microprocessor kit.
C-243.2	Students will be able to use of MSP430 microcontrollers along with GPIO port pin for programming to interface with LEDs, push buttons, potentiometer and motors with the use of interrupts also.
C-243.3	Create a design for varying the speed of DC motor and intensity of blinking LED using PWM programming techniques.
C-243.4	Students will be able to use various on-chip peripherals like Watchdog timer, Timer, ADC and DAC, serial communication USCI module for UART with SPI protocol in different given application.
C-243.5	Implement IOT based applications on MSP430 development board that imparts knowledge to students about Internet of Things (IOT).

ADVANCED ELECTRONICS SYSTEM LAB (REC 451) C-244 Year of Study: 2018-19

C-244.1	Understand the basics of simulation.
C-244.2	Analyse the simulation results of basic electronic circuits
C-244.3	Implement MOS based circuits like amplifiers, DC-DC converters etc.
C-244.4	Design ring-oscillators using CMOS.
C-244.5	Simulate Current-mirror in MOS technology.

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INTEGRATED CIRCUITS (REC-501): C-301 **Year of Study: 2018-19**

C-301.1	Able to design the current mirrors using BJT and MOS for a given IO and perform DC & AC analysis of IC-741 circuit.
C-301.2	Design and analyze the op amp based active filters (Butterworth 1st, 2nd order, KHN) for the given parameters.
C-301.3	Able to investigate the static & dynamic characteristics of CMOS inverter & design logic circuits using CMOS.
C-301.4	Able to use Op Amp in non-linear applications (log/antilog amplifier, comparator, multivibrator, Schmitt trigger, precision rectifier and peak detector).
C-301.5	Understand the working of IC-555 timer, PLL and A-D & D-A converters and use the IC 555 in designing of multivibrator.

PRINCIPLES OF COMMUNICATION (REC-502): C-302 **Year of Study: 2018-19**

C-302.1	Identify the key elements of Communication system and various amplitude modulations techniques involved.
C-302.2	Understand the features of angle Modulation Techniques and their comparative analysis and applications suitability.
C-302.3	Able to understand the digital modulation and multiplexing techniques in the communication system.
C-302.4	Acquire knowledge about pulse modulation, vocoders and mathematical representation of noise**.**
C-302.5	Evaluate the signal to noise ratio and figure of merit of various modulation techniques.

CONTROL SYSTEM – I (RIC-603): C-304 **Year of Study: 2018-19**

C-304.1	Able to minimize the use of components in control system.
C-304.2	Able to find Controllability and observability of the given system.
C-304.3	Able to calculate steady state and transient response of the system.
C-304.4	Can compute stability of the system using different techniques.
C-304.5	Able to determine phase and amplitude response for the given system.

ANTENNA AND WAVE PROPAGATION (NEC-504): C-305 **Year of Study: 2018-19**

C-305.1	Understand the concept of basics Antennas and its parameter**s (**radiation pattern, gain, directivity, and efficiency)**,** antenna array, Radio communication link, SNR.
C-305.2	Analyze the point sources, different type of antenna arrays and its radiation Patterns, the electric dipole, working design of Yagi-Uda, folded dipole.
C-305.3	Analyze the working principle of loop antenna, slotted antenna Log periodic antenna and micro strip antenna.
C-305.4	Understand the Concepts of Different Types of Antennas.VHF, UH, Microwave Antennas, and frequency independent antennas.
C-305.5	Classify the Different Kinds of Wave Propagation like ground wave, surface wave and space wave propagation. Controlling effect of medium and earth curvature S on wave propagations.

MANEGERIAL ECONOMICS (RAS-501): C-306 **Year of Study: 2018-19**

C-306.1	Describe Economy in general & economics in particular & the role of an Engineering, science & technology in an economy.
C-306.2	Understand the concept of demand and role of engineering process in maintaining and improving demand.
C-306.3	Understand demand forecasting & how the concept of Cost is helpful for an engineer before designing product and production process.
C-306.4	Determine the price of a product under various market conditions which is helpful in analyzing the price of product in future by comparing competitor price for taking pricing decisions.
C-306.5	Understand the concept of various market structures and role of engineering to sustain various types of market.

INTEGRATED CIRCUITS LAB (REC-551): C-307 **Year of Study: 2018-19**

C-307.1	Able to develop an in-depth understanding of the design principles and applications of integrated analogue circuits.
C-307.2	Able to design and realize analog filter circuits and oscillators for the given frequency and compare with theoretical values.
C-307.3	Able to design and realize the multivibrator for given parameter using 555 timer IC and compare the result with theoretical value.
C-307.4	Able to realize and analyze the comparator and Log/Antilog amplifier using op amp 741 and also design & realize the inverting/noninverting amplifier for given gain using 741.
C-307.5	Able to realize and analyse the function generator using op amp 741 and also perform the experiment to determine capture and lock range of PLL.

CONTROL SYSTEMS LAB (RIC-653): C-308 **Year of Study: 2018-19**

C-308.1	Study and analyze dc and ac motor position control system
C-308.2	Able to control the DC speed control system on open and closed loop.
C-308.3	Investigate the input/output characteristic of magnetic amplifier.
C-308.4	Analyze the Synchro Transmitter and Receiver in terms of position phase etc.
C-308.5	Simulate the performance of PID controllers and LEAD LAG compensator and also Simulate the open loop and closed loop response of linear system.

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COMMUNICATION LAB- I (REC-552): C-309 **Year of Study: 2018-19**

C-309.1	Able to understand amplitude &frequency modulation and demodulation and its related terms.
C-309.2	Analyze the modulation and demodulation of PAM,PWM,PPM
C-309.3	Able to understand radiation pattern of various antennas and calculation of its beam width.
C-309.4	Acquire knowledge of Super-heterodyne receiver and measure sensitivity & selectivity.
C-309.5	Acquire knowledge about sampling and reconstruction of analog signals.

MICROWAVE ENGINEERING (REC-601): C-311 **Year of Study: 2018-19**

C-311.1	Understand the basic concept of Microwaves and transmission lines like waveguides, micro strip lines and their different modes of operation.
C-311.2	Compare scattering matrix in microwave system & other 2-port network parameters and find out the scattering matrix of different microwave components like E-plane Tee, H-plane Tee, Magic Tee, Terminators, Attenuators, Phase Shifters, Isolators, Circulators and Directional Couplers as well as understand their applications.
C-311.3	Analyze the limitations of general semiconductor devices at microwave frequencies and also to understand the basic concept of different microwave devices (2-cavity Klystron amplifier, Reflex Klystron amplifiers, Magnetron , TWT& BWO) and their principles of operation and applications
C-311.4	Classify the Solid State amplifiers like microwave bipolar transistors, tunnel diodes, TEDs, Avalanche transit devices and their applications at microwave frequencies.
C-311.5	Understand the limitations of low frequency measuring devices at microwave frequency and to study a microwave bench & its set up, slotted line carriage , VSWR meter, Also to Understand the Measurement of different parameters like power, frequency , wavelength, impedance , reflection coefficient, VSWR, Insertion & Attenuation loss, antenna characteristics at microwave

DIGITAL COMMUNICATION (REC-602): C-312 **Year of Study: 2018-19**

C-312.1	Compare the line coding techniques and apply in the generation and detection digital modulation techniques
C-312.2	Understand the basic concepts of probabilities and random variables.
C-312.3	Evaluate the performance of digital communication system.
C-312.4	Apply the concept of spread spectrum for application in wireless communication**.**
C-312.5	Compute the bandwidth and transmission power and probability of error for various modulation schemes**.**

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DIGITAL SIGNAL PROCESSING (REC-503): C-314 **Year of Study: 2018-19**

C-314.1	Analyze & create structures of IIR and FIR filters.
C-314.2	Able to design IIR filter using the concept of Butterworth and Chebyschev.
C-314.3	Able to design FIR filter using different types of windows.
C-314.4	Evaluate the benefits of discretization of DTFT through DFT and compare the computation efficiency of FFT and DFT.
C-314.5	Create more efficient filters using multirate signal processing.

INDUSTRIAL MANAGEMENT (RAS-601): C-316 **Year of Study: 2018-19**

C-316.1	Apply theoretical concepts of management control in different areas of business in various industries.
C-316.2	Understand the principle of management, process chart and flow diagram.
C-316.3	Analyze inventory control and management techniques.
C-316.4	Able to understand of Operational control. Control over time, quality and customer profitability.
C-316.5	Performance measurement, such as balanced scorecards, benchmarks.

MICROWAVE ENGINEERING LAB (REC-651): C-317 **Year of Study: 2018-19**

C-317.1	Acquire knowledge about Microwave spectrum and wave propagation.
C-317.2	Able to compare and analyze the performance of Wave Guide benches and source
C-317.3	Analyze the performance of Microwave Components.
C-317.4	Measure the impedance of unknown load using smith chart.
C-317.5	Understand and measure the Antenna parameters such as radiation pattern, feeding techniques.

COMMUNICATION LAB – II (REC-652): C-318 **Year of Study: 2018-19**

C-318.1	Compare the line coding techniques and apply as per the practical requirement
C-318.2	Compare different modulation schemes and apply as per their advantage in various applications
C-318.3	Apply different techniques in modern digital communications; particularly source coding, channel coding, modulation and detection.
C-318.4	Analyse the waveform generation through harmonics so as to gain the concept of signal processing.
C-318.5	Ability to choose the digital modulation scheme for the practical purpose on the basis of the features of each scheme.

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CAD OF ELECTRONICS LAB (REC-554): C-319 **Year of Study: 2018-19**

C-319.1	Able to implement and simulate analog circuits and digital circuits in PSPICE.
C-319.2	Able to perform ac , dc and transient analysis of analog and digital circuits
C-319.3	Able to correctly analyze a circuit and compare its theoretical performance to actual performance.
C-319.4	Foster ability to identify and code the module using different modeling styles.
C-319.5	Ability to synthesize the VHDL code.

MICROCONTROLLER FOR EMBEDDED SYSTEMS LAB (RIC-651): C-323 **Year of Study: 2018-19**

C-323.1	Students will have a knowledge about 8051 microcontroller along with its architecture, concept of interrupts, programming and interfacing with external world.
C-323.2	Students will learn about the basics of MSP430 microcontrollers along with GPIO port pin programming to interface with LEDs, push buttons, potentiometer, motors& accelerometer with the use of interrupts also.
C-323.3	Students will have an extensive knowledge about various on-chip peripherals like Watchdog timer, Timer, PWM, ADC and DAC etc.
C-323.4	Students will have an understanding of serial communication programming of USB and SPI with MSP430 having the knowledge of their protocols.
C-323.5	Students will get an exposure with practical applications like Wi-Fi for communication and CC3100 module for setting of IP address.

SOCIOLOGY (RAS-602): C-324 **Year of Study: 2018-19**

C-324.1	Understand the nature and scope of industrial sociology with characteristics of the factory system and work environment.
C-324.2	Understand a variety of explanations accounting for human behavior (in evolutionary and/or contemporary contexts)
C-324.3	Identify the role of Motivation and Job satisfaction, stress management. Organizational culture, Leadership & group dynamics.
C-324.4	Understand the applications of psychology in industrial behavior
C-324.5	Engage in innovative and integrative thinking and problem solving. Develop meaningful professional direction for life after graduation

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CYBER SECURITY (RUC-501): C-325 **Year of Study: 2018-19**

C-325.1	Student will be able to discuss the roles played by information technology in today's business and define various technology architectures on which information systems are built
C-325.2	Student will develop an understanding of security policies (such as authentication, integrity and confidentiality)
C-325.3	Gain familiarity with prevalent network and distributed system attacks, defenses against them, and forensics to investigate the aftermath
C-325.4	Student will develop a basic understanding of cryptography, how it has evolved, and some key encryption techniques used today.
C-325.5	Students came to know about the Ethical, social and legal aspects of e-commerce. Students will be able to identify advantages and disadvantages of technology choices such as merchant server software and electronic payment

RADAR ENGINEERING (REC-065) C-326 **Year of Study: 2019-20**

C-326.1	Understand basic radar operation, equation, block diagram, frequencies and applications
C-326.2	Analyze effect of noise, target cross-section and other system parameters like transmitter power, pulse repetition frequency, antenna parameters and system noise over the radar operation.
C-326.3	Understand and evaluate operation of various types of moving target identification radars and techniques to improve operation and limitations.
C-326.4	Understand and evaluate operation of various types of tracking radars and their comparison.
C-326.5	Understand basic radar measurements of target and techniques to improve target recognition and evaluate effect of clutter on radar performance

DIGITAL SIGNAL PROCESSING LAB (REC-553): C-327 **Year of Study: 2018-19**

C-327.1	Understand the DSP Processors, Code Composer Studio and architecture of TMS320C6713 DSP processor.
C-327.2	Analyze the basic operations of Signal processing using MATLAB
C-327.3	Analyze the spectral parameter of window functions.
C-327.4	Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters.
C-327.5	Design the signal processing algorithm using MATLAB.

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ENTREPRENEURSHIP DEVELOPMENT (NOE-071): C-402 **Year of Study: 2018-19**

C-402.1	Apply effective written and oral communication skills to business situations
C-402.2	Demonstrate the ability to provide a self-analysis in the context of an entrepreneurial career.
C-402.3	Use critical thinking skills in business situations.
C-402.4	Apply an ethical understanding and perspective to business situations.
C-402.5	Demonstrate the ability to develop a well-presented feasible business plan

OPTICAL COMMUNICATION (NEC-701): C-404 **Year of Study: 2018-19**

C-404.1	Understand optical communication, optical spectral band, total internal reflection, electromagnetic mode theory, phase & group velocity and also to differentiate between optical fiber communication and other communication system.
C-404.2	Able to differentiate type of fiber required for transmission and also calculate the attenuation, group delay, losses, cut off wavelength for the given parameters.
C-404.3	Analyze the optical amplifiers and important parts at the transmitter (Semiconductor lasers/LEDs, modulators etc) as well as at the receiver sides (optical detector etc.) of the optical communications system, and determine resonant frequency external quantum efficiency.
C-404.4	Compare the different types of photo detectors (GaAs avalanche photo diode, PIN photo diode)
C-404.5	Design optical digital link (point to point link) for the given parameters and analyze the sources of errors, receiver error sensitivity.

DATA COMMUNICATION NETWORKS (NEC-702B): C-405 **Year of Study: 2018-19**

C-405.1	Gain knowledge of basic components of Data communication and their characteristics, mathematical modeling for communication channel.
C-405.2	Represent the deterministic and stochastic signals, random noise, analog and digitally modulated signals and also determine the signal to noise ratio.
C-405.3	Optimize the receivers for corrupted signals by AWGN, error performance, modulation methods (OFDM, MIMO), source & channel coding (Hamming code).
C-405.4	Gain knowledge of error and flow control, sliding window protocol, HDLC, PPP, LAN, Ethernet, hubs, bridges and switches.
C-405.5	Gain knowledge of Transport layer and its protocols, static & dynamic channel allocation in LAN and MAN, multiple access protocol (wavelength division), collision free protocol, limited contention protocol, and IEEE standard 802.3.

VLSI DESIGN (NEC-703): C-406 **Year of Study: 2018-19**

C-406.1	Understand the Fabrication of MOS device (design partitioning, logic design, circuit design, physical design, design verification packaging and testing).
C-406.2	Analyze transient response, RC delay, linear delay, logical efforts, static and dynamic power for the given device.
C-406.3	Optimize the designing by power- delay optimization, interconnect modeling.
C-406.4	Able to compare different semiconductor memories (DRAM, SRAM, ROM, Flash).
C-406.5	Able to find the faults, and find controllability and observability for logic circuits and also design the low power CMOS logic circuits trough voltage scaling, optimization of switching activity, reduction in switching capacitance and adiabatic logic circuits.

ELECTRONIC CIRCUIT DESIGN LAB (NEC-752A): C-408 **Year of Study: 2018-19**

C-408.1	To carry-out design of electronic circuit having some desired functionality using basic electronic building blocks like op-amp, timer IC 555, OTA, analog multiplier, TTL/CMOS ICs etc.
C-408.2	Develop the ability to analyze and design analog electronic circuits using discrete components.
C-408.3	To verify the circuit operation and output characteristics with the help of CAD of electronics tools such as PSpice/multisim.
C-408.4	To implement the circuit using bread board/printed circuit board and verify the working and characteristics using instruments like CRO, function generator, multimeter etc.
C-408.5	Design, construct, and take measurement of analog/digital circuit and compare experimental results in the laboratory with theoretical analysis.

MINOR PROJECT (NEC-754): C-409 **Year of Study: 2018-19**

C-409 .1	Able to manage as a member of team to use the technique, skill and modern engineering tools and to collect and disseminate information related to selected project
C-409 .2	Able to find solutions to authentic (real world and ill-defined) problems.
C-409 .3	Able to design a system, component or process to meet desired need within realistic constraints.
C-409 .4	Able to develop an action plan to improve presentation skills and have the confidence to make more of an impact on their audience.
C-409 .5	Able to write research-based documents, including journal and conference papers.

Department of Electronics & Communication Engineering

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INDUSTRIAL TRAINING VIVA-VOCE (NEC-753): C-410 **Year of Study: 2018-19**

C-410 .1	To plan, organize and engage in active learning experiences both inside and outside the classroom.
C-410.2	Identify and fill the gap between classroom and the real field world.
C-410 .3	Explore their theoretical skills in "real life" examples of business and engineering management
C-410 .4	Identify, understand, and tackle a real field problem by applying their theoretical & practical knowledge and experiences in real field situation.
C-410 .5	To understand the nuances and realities of the shop floor, understand the risky conditions in which workers work, the people management challenges involved in managing workers apart from getting hands-on technical knowledge.

OPTICAL NETWORKS (NEC-802): C-411 **Year of Study: 2018-19**

C-411.1	Able to understand optical network design and its elements and also the nonlinear effects.
C-411.2	Able to understand different type of components isolators and circulators, Mach Zander interferometer, waveguide, AOTF, optical multiplexer and filters.
C-411.3	Able to understand SONET/SDH and IP network architecture and frames.
C-411.4	Define the optical transport network, light path topology, and protection in SONET/SDH and client layers.
C-411.5	Able to understand optical time domain multiplexing and concept of interleaving.

WIRELESS & MOBILE COMMUNICATION (NEC-801): C-412 **Year of Study: 2018-19**

C-412.1	To understand the practical concept behind origination of call and its completion, wireless communication link, cellular system components and wireless channel modelling.
C-412.2	Compute the correlation between Diversity and fading, Equalization and ISI.
C-412.3	Practically relate the distribution of channels for wireless communication. Also Understand the multiplexing and multiple access (FDMA, TDMA, CDMA, OFDMA, ALOHA)
C-412.4	Compare the different Wireless communication systems and standards: GSM, IS-95 to CDMA 2000 and their importance in communication.
C-412.5	Understand the practical concept behind wireless communication adhoc networks (Wi-Fi, Wi-max, Li-Fi, and its evolution till 4G.

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ELECTRONICS SWITCHING (NEC-041): C-413 **Year of Study: 2018-19**

C-413.1	Understand the historical developments of telecommunication networks & switching systems and compare the crossbar switching, electronic switching and digital switching.
C-413.2	Understand the switching functions, space & time division switching, two dimensional and digital cross connect switching.
C-413.3	To understand the probabilistic methods & statistics to solve telecommunication n/w problems and to design, develop & implement such networks.
C-413.4	To understand the basic concepts of signaling techniques used in transfer of voice and control signals through telecommunication n/w.
C-413.5	To design data networks and understand the concepts of networks used to carry voice as well as data. Also understand the packet switching concept, routing and flow control, TCP/IP, ATM.

MAJOR PROJECT (NEC-851): C-414 **Year of Study: 2018-19**

C-414.1	Able to manage as a member of team to use the technique, skill and modern engineering tools and to collect and disseminate information related to selected project
C-414.2	Able to find solutions to authentic (real world and ill-defined) problems.
C-414.3	Able to design a system, component or process to meet desired need within realistic constraints.
C-414.4	Able to develop an action plan to improve presentation skills and have the confidence to make more of an impact on their audience.
C-414.5	Able to write research-based documents, including journal and conference papers.

NON CONVENTIONAL ENERGY RESOURCES (NOE-081): C-415 **Year of Study: 2018-19**

C-415.1	Understand the various non-conventional energy resources.
C-415.2	Understand the concept of Solar Thermal Energy.
C-415.3	Compare solar thermal energy with Geothermal Energy.
C-415.4	Understand the basic working Principle behind Thermo-electrical and thermionic Conversions.
C-415.5	Understand the concept of Bio-mass and its usage.

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GENERAL PROFICIENCY (NGP-701/801): C-416 **Year of Study: 2018-19**

C-416.1	To develop communication skills and can participate in extracurricular activities.
C-416.2	Students will become sincere and regular in all curricular and extracurricular activities.
C-416.3	Students will develop their overall personality in terms of human values and become good sensitive responsible citizen of India
C-416.4	Students will become confident to face the challenges in the corporate world
C-416.5	Students will be able to identify and explore their personal hobbies and can sharpen their personality as an individual.

INFORMATION THEORY & CODING (NEC-031): C-417 **Year of Study: 2018-19**

C-417.1	To understand the concepts of entropy, mutual information and Jensen, log sum fano's inequality.
C-417.2	To compress the data using different source codes (Huffman codes, Shannon Fano Elias coding and Kraft inequality for uniquely decodable code).
C-417.3	To understand the concept of channel capacity, channel coding theorem, 7.2 symmetric channel and also determine the channel capacity for given information.
C-417.4	To develop the block codes (single parity check, product code, repetition code, hamming code) and linear codes (parity check matrices, shortened and extended code) for given information.
C-417.5	To encode the convolution codes for the given information and determine generator matrices, generator polynomials for the given convolution codes and graphically represent the given convolution codes.

OPTICAL COMMUNICATION AND NETWORKING LAB (NEC-751): C-418 **Year of Study: 2018-19**

C-418.1	Identify the different types of cables, connectors and different commands in networking.
C-418.2	Able to make subnet and configure router and DHCP servers.
C-418.3	Able to configure VLAN.
C-418.4	Able to setup fiber optic analog link & able to measure characteristic parameter in fiber and losses in optical fiber.
C-418.5	Implement a simple file transfer protocol (FTP) using connection oriented and connection less sockets.

DIGITAL IMAGE PROCESSING (NEC-032): C-419 **Year of Study: 2018-19**

C-419.1	Review the fundamental concepts of a digital image processing system.
C-419.2	Analyse images in the frequency domain using various transforms.
C-419.3	Evaluate the techniques for image enhancement and image restoration.
C-419.4	Categorize various compression techniques.
C-418.5	Interpret Image compression standards.