MALLAREDDY ENGINEERING COLLEGE AND MANAGEMENT SCIENCES
(Approved by AICTE New Delhi & Affiliated to JNTU Hyderabad)
Kistapur Village, Medchal, Medchal District-501401

DEPT. OF ELECTRONICS & COMMUNICATION ENGINEERING						
R-22 REGULATION - COURSE OUTCOMES						
S. No	CLASS	REGULATION	Subject	Course Code	CO's	Course Oucomes
1	I/I	R-22	Matrices and Calculus	MA101BS	CO-1	Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
					CO-2	Find the Eigen values and Eigen vectors. Reduce the quadratic form to canonical form using orthogonal transformations
					CO-3	Solve the applications on the mean value theorems Evaluate the improper integrals using Beta and Gamma functions
					CO-4	Find the extreme values of functions of two variables with/ without constraints.
					CO-5	Evaluate the multiple integrals and apply the concept to find areas, volumes.
2	I/I	R-22	Applied Physics	PH102BS	CO-1	Understand physical world from fundamental point of view by the concepts of Quantum mechanics and visualize the difference between conductor, semiconductor, and an insulator by classification of solids.
					CO-2	Identify the role of semiconductor devices in science and engineering Applications.
					CO-3	Explore the fundamental properties of dielectric, magnetic materials and energy for their applications
					CO-4	Appreciate the features and applications of Nanomaterials.
					CO-5	Understand various aspects of Lasers and Optical fiber and their applications in diverse fields.
3	I/I	R-22	C Programming for Engineers	EC103ES	CO-1	Draw flowcharts for solving arithmetic and logical problems
					CO-2	Develop modular reusable code by understanding concepts of functions.
					CO-3	Formulate algorithms and programs using arrays, pointers, strings and structures.
					CO-4	Understands about the functions and dynamic memory allocation and deal location.
					CO-5	Gain knowledge of searching and sorting techniques through algorithm
					CO-1	Study and practice on machine tools and their operations
					CO-2	Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding.

4	I/I	R-22	Engineering Workshop	ME104ES	CO-3	Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling.	
					CO-4	Apply basic electrical engineering knowledge for house wiring practice.	
					CO-5	Practice on Block smithy of components using workshops	
5	I/I	R-22	English for Skill Enhancement	EN105HS	CO-1	Understand the importance of vocabulary and sentence structures.	
					CO-2	Choose appropriate vocabulary and sentence structures for their oral and written communication.	
					CO-3	Demonstrate their understanding of the rules of functional grammar.	
					CO-4	Develop comprehension skills from the known and unknown passages.	
					CO-5	Take an active part in drafting paragraphs, letters, essays, abstracts, précis and reports in various contexts. Acquire basic proficiency in reading and writing modules of English.	
6	I/I	R-22	Elements of Electronics and Communication Engineering	EC106ES	CO-1	Identify the different components used for electronics applications	
					CO-2	Measure different parameters using various measuring instrument.	
					CO-3	Distinguish various signal used for analog and digital communications	
					CO-4	Study the various gates module and write down the truth table	
					CO-5	Study the various Digital and Analog ICs	
7	I/I	R-22	Applied Physics Laboratory	PH107BS	CO-1	Identify the different components used for electronics applications	
					CO-2	Measure different parameters using various measuring instrument.	
					CO-3	Distinguish various signal used for analog and digital communications	
					CO-4	Study the various gates module and write down the truth table	
					CO-5	Study the various Digital and Analog ICs	
8	I/I	R-22	C Programming for Engineers Laboratory	EC108ES	CO-1	Write algorithms and to draw flowcharts for solving problems and translate the algorithms / flowcharts to programs (in C language).	
					CO-2	Use functions to develop modular reusable code.	
					CO-3	Use arrays, pointers, strings and structures to formulate algorithms and programs.	
					CO-4	Able to create, read and write to and append to from simple text and binary files.	
					CO-5	Able to search and sort data from different array elements.	
9	I/I	R-22	English Language and Communication Skills Laboratory	EN109HS	CO-1	Better understanding of nuances of English language through audio- visual experience and group activities	
					CO-2	Speak clearly with the right accent and intonation	
					CO-3	Speak with clarity and confidence which in turn enhances their employability skills	
					CO-4	N Neutralization of accent for intelligibility	
					CO-5	Understand and apply knowledge of human communication and language process.	

10	I/I	R-22	Environmental Science	*MC110	CO-1	Define basic definitions and can explain complex relationship between Predators, Prey and the plant community.
					CO-2	Categorize resources in natural environment and its relationships with human activities as well as human impacts.
					CO-3	Demonstrate an awareness, knowledge and appreciation of the intrinsic values of ecological processes and communities.
					CO-4	Assess different scientific research strategies, including collection, management, evaluation and interpretation of environmental data and role of information technology in environment.
					CO-5	Examine the transnational character of environmental problems, protection acts and ways of addressing them, including interactions across local to global scales.
11	I/II	R-22	Ordinary Differential Equations and Vector Calculus	MA201BS	CO-1	Identify whether the given differential equation of first order is exact or not.
					CO-2	Solve higher differential equation with constant coefficients
					CO-3	Apply the concept to find ordinary differential equations using Laplace transforms techniques
					CO-4	Explain gredients, potential functions, directional derivatives of functions of several variables.
					CO-5	Evaluate the line, surface and volume integrals and converting them from one to another.
12	I/II	R-22	Engineering Chemistry	CH202BS	CO-1	The students are able to understand the basic properties of water and its usage in domestic and industrial purposes.
					CO-2	Students will acquire the basic knowledge of electro chemical procedures related to corrosion and its control.
					CO-3	They can learn the fundamentals and general properties of polymers and other engineering materials.
					CO-4	They can predict potential applications of chemistry and practical utility in order to become good engineers and entrepreneurs.
					CO-5	Students are able to analyzing the various compounds based on configurational and conformational analysis of molecules and reaction mechanisms
13	I/II	R-22	Computer Aided Engineering Graphics	ME203ES	CO-1	Apply computer aided drafting tools to create 2D and 3D objects
					CO-2	Sketch conics and different types of solids.
					CO-3	Appreciate the need of Sectional views of solids and Development of surfaces of solids
					CO-4	Read and interpret engineering drawing.
					CO-5	Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting.
					CO-1	Understand and analyze basic Electrical circuits
					CO-2	Study the working principles of Electrical Machines and Transformers

14	I/II	R-22	Basic Electrical Engineering	EE204ES	CO-3	To understand working principle, operation of transformers and its types.
					CO-4	Introduce components of Low Voltage Electrical Installations.
					CO-5	To understand and analyze basic Electric and Magnetic circuits. Representation of AC Quantities
15	I/II	R-22	Electronic Devices and Circuits	EC205ES	CO-1	Acquire the knowledge of various electronic devices and their use on real life.
					CO-2	Know the applications of various devices.
					CO-3	Acquire the knowledge about the role of special purpose devices and their applications.
					CO-4	Acquire the knowledge about the role of Votages and capacitors
					CO-5	Acquire the knowledge about Zener Diode **-** Characteristics,
16	I/II	R-22	Applied Python Programming Laboratory	EC206ES	CO-1	Build basic programs using fundamental programming constructs.
					CO-2	Write and execute python codes for different applications.
					CO-3	Capable to implement on hardware boards.
					CO-4	Verify programs using modular approach, file I/O, Python standard library
					CO-5	Implement Digital Systems using Python
17	I/II	R-22	Engineering Chemistry Laboratory	CH207BS	CO-1	Students are able to determination of parameters like hardness and chloride content in water
					CO-2	Students are analyzing the various water samples with different methods and various water treatment methods for industrial usages.
					CO-3	Students are able to estimation of rate constant of a reaction from concentration – time relationships.
					CO-4	Students are able to determination of physical properties like adsorption and viscosity
					CO-5	Students are able to calculation of Rf values of some organic molecules by TLC technique
18	I/II	R-22	Basic Electrical Engineering Laboratory	EE208ES	CO-1	Verify the basic Electrical circuits through different experiments.
					CO-2	Evaluate the performance calculations of Electrical Machines and Transformers through various testing methods.
					CO-3	Analyze the transient responses of R, L and C circuits for different input conditions.
					CO-4	Understand the measurement, calculations and relation between the basic electrical parameters
					CO-5	Understand the basic characteristics of transformers and connections. To Assess the performance of different machines using different methods.
			Electronic Devices and Circuits		CO-1	Acquire the knowledge of various semiconductor devices and their use in real life.
					CO-2	Design aspects of biasing and keep them in active region of the device for functional circuits

19	I/II	R-22	Laboratory	EC209ES	CO-3	Acquire the knowledge about the role of special purpose devices and their applications.
					CO-4	Acquire the knowledge about the role of Zener diode
					CO-5	Acquire the knowledge about the role of Photo diode characteristics and Solar cell characteristics
20	II/I	R-22	Numerical Methods and Complex variables	MA301BS	CO-1	Express any periodic function in terms of sine and cosine
					CO-2	Find the root of a given polynomial and transcendental equations.
					CO-3	Estimate the value for the given data using interpolation
					CO-4	Find the numerical solutions for a given first order ODE's
					CO-5	Analyze the complex function with reference to their analyticity, integration using Cauchy' integral and residue theorems
21	II/I	R-22	Analog Circuits	EC302PC	CO-1	Learn the concepts of, load line analysis and biasing techniques
					CO-2	Learn the concepts of high frequency analysis of transistors
					CO-3	To give understanding of various types of amplifier circuits
					CO-4	Learn the concepts of small signal analysis of BJT and FET
					CO-5	To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.
22	II/I	R-22	Network analysis and Synthesis	EC303PC	CO-1	To understand the basic concepts on RLC circuits.
					CO-2	To know the behavior of the steady state and transient states in RLC circuits.
					CO-3	To understand the two port network parameters.
					CO-4	Learn the design concepts of various filters and attenuators
					CO-5	Analyze the transmission line parameters and configurations
23	II/I	R-22	Digital Logic Design	EC304PC	CO-1	To understand common forms of number representation in logic circuits. concepts used in the design of digital systems.
					CO-2	To learn basic techniques for the design of digital circuits and fundamental
					CO-3	To understand the concepts of combinational logic circuits and sequential circuits.
					CO-4	To understand the Realization of Logic Gates Using Diodes & Transistors.
					CO-5	Known about the logic families and realization of logic gates.
24	II/I	R-22	Signals and Systems	EC305PC	CO-1	Classify signals and systems and their analysis in time and frequency domains
					CO-2	Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
					CO-3	Understand Laplace and Z-transforms their properties for analysis of signals and systems.
					CO-4	Identify the need for sampling of CT signals, types and merits and demerits of each type.
					CO-5	Establish the relation between Fourier and Laplace transforms
					CO-1	Design amplifiers with required Q point and analyse amplifier characteristics

					CO-2	Examine the effect multistage amplification on frequency response
					CO-3	CO3. Investigate feedback concept in amplifiers and oscillator
25	II/I	R-22	Analog Circuits Laboratory	EC306PC	CO-4	CO4. Design an RC phase shift oscillator circuit and derive the gain condition for oscillations practically for given frequency
					CO-5	CO5. Design a Colpitts oscillator circuit for the given frequency and draw the output waveform
26	II/I	R-22	Digital logic Design Laboratory	EC307PC	CO-1	CO1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.
					CO-2	CO2. Define Postulates of Boolean algebra and to minimize combinational functions, and design the combinational circuits.
					CO-3	CO3. Design and analyze sequential circuits for various cyclic functions.
					CO-4	CO4. Characterize logic families and analyze them for the purpose of AC and DC parameters.
					CO-5	CO5. Examine the behavior of sequential circuits using digital IC's.
27	II/I	R-22	Basic Simulation Laboratory	EC308PC	CO-1	Generate, analyze and perform various operations on Signals/Sequences both in time and Frequency domain
					CO-2	Analyze and Characterize Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling
					CO-3	Generate different Random Signals and capable to analyze their Characteristics
					CO-4	Apply the Concepts of Deterministic and Random Signals for Noise removal Applications and on other Real Time Signals
					CO-5	Understand autocorrelation and cross correlation between signals and sequences .
28	II/I	R-22	Constitution of India	*MC309	CO-1	Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
					CO-2	To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional role and entitlement to civil and economic rights as well as the emergence of nationhood in the early years of Indian nationalism.
					CO-3	To address the role of socialism in India after the commencement of the Bolshevik Revolution in 1917 and its impact on the initial drafting of the Indian Constitution.
29	II/II	R-22	Probability Theory and Stochastic Processes	EC401PC	CO-1	Understand the concepts of Random Process and its Characteristics.
					CO-2	Understand the response of linear time Invariant system for a Random Processes.
					CO-3	Determine the temporal characteristics of Random Signals.
					CO-4	Determine the Spectral characteristics of Random Signals.
					CO-5	Understand the concepts of Noise in Communication systems.
					CO-1	Express any periodic function in terms of sine and cosine

					CO-2	Find the root of a given polynomial and transcendental equations.
30	II/II	R-22	Electromagnetic Fields and Transmission Lines	EC402PC	CO-3	Estimate the value for the given data using interpolation
					CO-4	Find the numerical solutions for a given first order ODE's
					CO-5	Analyze the complex function with reference to their analyticity, integration using Cauchy' integral and residue theorems
31	II/II	R-22	ANALOG AND DIGITAL COMMUNICATIONS	EC403PCl	CO-1	To develop ability to analyze system requirements of Analog and digital communication systems.
					CO-2	To understand the generation, detection of various Analog and digital modulation techniques.
					CO-3	To acquire the vortical knowledge of each block in AM, FM transmitters and receivers.
					CO-4	To understand the concepts of baseband transmissions
					CO-5	Understand the concepts of Digital Modulation Techniques and Baseband transmission
32	II/II	R-22	LINEAR AND DIGITAL IC APPLICATIONS	EC404PC	CO-1	To introduce the basic building blocks of linear integrated circuits.
					CO-2	To introduce the theory and applications of Analog multipliers and PLL.
					CO-3	To introduce the concept sine waveform generation and introduce some special function ICs.
					CO-4	To understand and implement the working of basic digital circuits.
					CO-5	Acquire the knowledge about the Data converters.
33	II/II	R-22	ELECTRONIC CIRCUIT ANALYSIS	EC405PC	CO-1	Learn the concepts of Power Amplifiers.
					CO-2	To give understanding of tuned amplifier circuits
					CO-3	Understand various multivibrators using transistors and sweep circuits.
					CO-4	Design circuit like amplifiers.
					CO-5	Design circuit like oscillators using the transistors, diodes
34	II/II	R-22	ANALOG AND DIGITAL COMMUNICATIONS LABARATORY	EC406PC	CO-1	Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics
					CO-2	Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics
					CO-3	Apply different types of Sampling with various Sampling rates and duty Cycles
					CO-4	Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically
					CO-5	Apply time division multiplexing concepts in different pulse modulation techniques
35	II/II	R-22	LINEAR AND DIGITAL IC APPLICATIONS LABORATORY	EC407PC	CO-1	Design and implementation of various analog circuits using 741 ICs.
					CO-2	Design and implementation of various Multivibrators using 555 timer.
					CO-3	Design and implement various circuits using digital ICs.

					CO-4	Design and implement ADC, DAC and voltage regulators.
					CO-5	Construct and analyze voltage regulator circuits
36	II/II	R-22	ELECTRONIC CIRCUIT ANALYSIS LABORATORY	EC408PC	CO-1	Design power amplifiers and find its efficiency
					CO-2	Design tuned amplifiers and find its Q-factor
					CO-3	Design various multivibrators and sweep circuits. Understand the necessity of linearity
					CO-4	Design sampling gates and understanding the concepts of frequency division
					CO-5	Quantify their ability to communicate effectively through weekly written reports and lab notebooks.
37	II/II	R-22	GENDER SENSITIZATION LAB	*MC410	CO-1	To develop students' sensibility with regard to issues of gender in contemporary India and To expose the students to debates on the politics and economics of work
					CO-2	To provide a critical perspective on the socialization of men and women.
					CO-3	To introduce students to information about some key biological aspects of genders.
					CO-4	To help students reflect critically on gender violence.
					CO-5	To expose students to more egalitarian interactions between men and women.
38	III/I	R-22	MICROCONTROLLERS	EC501PC	CO-1	Known the internal architecture, organization and assembly language programming of 8086
					CO-2	Known the internal architecture, organization and assembly language programming of 8051/controllers
					CO-3	Learn the interfacing techniques to 8086 and 8051 based systems
					CO-4	Known the internal architecture of ARM processors and basic concepts of advanced ARM processors
					CO-5	Analyze architecture and interrupt structure of RISC microcontrollers
39	III/I	R-22	IOT ARCHITECTURES AND PROTOCOLS	EC502PC	CO-1	Explore the Evolution of IoT, its Growth and Applications
					CO-2	Know the components of IoT and Compare the various architectures of IoT.
					CO-3	Acquire the knowledge on data management of IoT
					CO-4	Establish the knowledge on various IoT protocols like Data link, Network, Transport, Session,Service layers.
					CO-5	Applications of IOT
40	III/I	R-22	Control Systems	EC503PC	CO-1	Describe the feedback control
					CO-2	Describe basic components of control systems
					CO-3	Analyze various time domain methodologies for the design of linear control systems
					CO-4	Analyze frequency domain methodologies for the design of linear control systems

					CO-5	Analyze methods of stability analysis of systems from transfer function forms and able to develop the state space models for various systems
41	III/I	R-22	Business Economics & Financial Analysis	SM504MS	CO-1	Understand the various Forms of Business and the impact of economic variables on the Business.
					CO-2	Analyse the Demand and Supply requirements of the firm,
					CO-3	Understand Production, Cost, Market Structure, Pricing aspects.
					CO-4	Interpret the firm's financial position of a Company.
					CO-5	Analyze the Financial Statements of a Company.
42	III/I	R-22	ELECTRONIC MEASURMENTS AND INSTRUMENTATIO	EC513PE	CO-1	provides an understanding of various measuring system functioning and metrics for performance analysis.
					CO-2	Provides understanding of principle of operation, working of different electronic instruments viz. signal generators, signal analyzers, recorders and measuring equipment.
					CO-3	Understanding the concepts of various measuring bridges and their balancing conditions.
					CO-4	Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers.
					CO-5	Provides understanding of use of various measuring techniques for measurement of different physical parameters using different classes of transducers and bridges
43	III/I	R-22	MICROCONTROLLERS LABORATORY	EC505PC	CO-1	Demonstrate MASM assembler programming.
					CO-2	Develop an ALP in 8086 and its interfacing circuits.
					CO-3	Develop an ALP in 8051 for parallel ports and timers
					CO-4	Develop an ability in designing a microprocessor and microcontroller systems
					CO-5	Apply standard test and measurement equipment to evaluate digital interfaces.
44	III/I	R-22	IOT ARCHITECTURE AND PROTOCOLS LABORATORY	EC506PC	CO-1	Utilize the different sensors like room temperature, DHT, Humidity etc
					CO-2	Interface the sensors and processor for transmission of data
					CO-3	Capture the images and process it on Arduino/NodeMCU/Raspberry Pi.
					CO-4	know the utilization of various protocols like I2c, UART communication etc
					CO-5	arduino program to demonstrate UART communication protocol
45	III/I	R-22	ADVANCED ENGLISH COMMUNICATION SKILLS LABORATORY	EN508HS	CO-1	Develop their LSRW skills
					CO-2	Overcome their Mother tongue influence
					CO-3	Express/interpret their views without hesitation
					CO-4	Lose their stage fear and develop self-confidence
					CO-5	Be able to reach corporate expectations

46	III/I	R-22	Intellectual Property Rights	*MC510	CO-1	Discuss the fundamental aspects of Intellectual property Rights which play a major role in development and management of innovative projects in industries.
					CO-2	Examine Trademarks, Acquisition of Trade Mark Rights and its registration processes.
					CO-3	Evaluate various aspects relating to copyrights and its procedure for registration processes.
					CO-4	Evaluate with the Trade Secret Law, protection for submission, Unfair Competition
					CO-5	Interpret about current trends in IPR and the steps taken by the Government of India in fostering IPR
47	III/II	R-22	ANTENNAS AND WAVE PROPAGATION	EC601PC	CO-1	Understand the parameter consideration viz antenna efficiency, beam efficiency etc.
					CO-2	Design antenna and field evaluation under various conditions
					CO-3	Understand the array system of the different antennas , will gain knowledge of about means of propagation of EM WAVES i.e., free space propagation
					CO-4	Understand the design issues, operations of fundamental antennas like yagi-uda, horn antenna etc..
					CO-5	Design a lens structure and also the bench setup for antenna parameter measurements
48	III/II	R-22	Digital Signal Processing	EC602PC	CO-1	Students will be able to understand LTI system characteristics and Multirate signal processing.
					CO-2	Students will be able to represent inter-relationship between DFT and various transforms.
					CO-3	Students will be able to design a digital IIR filter for a given specification.
					CO-4	Students will be able to design a digital FIR filter for a given specification.
					CO-5	Students will be able to acknowledge the significance of various filter structures and effects of round off errors.
49	III/II	R-22	CMOS VLSI DESIGN	EC603PC	CO-1	Understand operation of a MOS transistor
					CO-2	Understand down to physical level and relate the knowledge to the development of its operational equations
					CO-3	Analyze and implement various logic gates and circuits, using MOS Transistors
					CO-4	Design circuit components and verify their performance using simulation tools
					CO-5	Design static CMOS Combinational circuits
50	III/II	R-22	EMBEDDED SYSTEM DESIGN	EC623PE	CO-1	Express any periodic function in terms of sine and cosine
					CO-2	Find the root of a given polynomial and transcendental equations.
					CO-3	Estimate the value for the given data using interpolation
					CO-4	Find the numerical solutions for a given first order ODE's

					CO-5	Analyze the complex function with reference to their analyticity, integration using Cauchy' integral and residue theorems
51	III/II	R-22	BASIC SENSORS TECHNOLOGY	OE603PC	CO-1	To provide basic knowledge in transduction principles, sensors and transducer technology and measurement systems.
					CO-2	To provide better familiarity with the Theoretical and Practical concepts of Transducers
					CO-3	To provide familiarity with different sensors and their application in real life.
					CO-4	To provide the knowledge of various measurement methods of physical and electrical parameters
					CO-5	To provide the knowledge of various calibration and interfacing devices
52	III/II	R-22	Digital Signal Processing Lab	EC604PC	CO-1	Develop and Implement DSP algorithms in software using a computer language such as C with TMS320C6713 floating point Processor.
					CO-2	Develop various DSP Algorithms using MATLAB Software package.
					CO-3	Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth, Chebyshev filters.
					CO-4	Analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filters using window techniques.
					CO-5	Design and Analyze Digital Filters using FDA Tool.
53	III/II	R-22	CMOS VLSI DESIGN LABORATORY	EC605PC	CO-1	Understand the physical design process of Digital Integrated Circuits.
					CO-2	Describe procedure for designing of programmable circuits.
					CO-3	Demonstrate the ability to use various EDA tools for digital system design
					CO-4	Implement various combinational and sequential circuits using VHDL on FPGA.
					CO-5	Implement schematic and layout of various digital CMOS logic circuits using EDA tools.
54	III/II	R-22	ADVANCED COMMUNICATIONS LABORATORY	EC606PC	CO-1	Develop their LSRW skills
					CO-2	Overcome their Mother tongue influence
					CO-3	Express/interpret their views without hesitation
					CO-4	Lose their stage fear and develop self-confidence
					CO-5	Be able to reach corporate expectations
					CO-1	Understand technologies on the basis of ecological principles and environmental regulations
					CO-2	Evaluate technologies on the basis of ecological principles and environmental regulations

55	III/II	R-22	Environmental Science	*MC609	CO-3	Develop technologies on the basis of ecological principles and environmental regulations
					CO-4	Understand the impacts of developmental activities and mitigation measures
					CO-5	Understand the importance of ecological balance for sustainable development
56	IV/I	R-22	Microwave and Optical Communications	EC701PC	CO-1	Understand power generation at microwave frequencies and derive the performance characteristics.
					CO-2	Comprehend the need for solid state microwave sources and understand the principles of solid state devices.
					CO-3	Distinguish between the different types of waveguide and ferrite components, and select proper components for engineering applications
					CO-4	Understand the utility of S-parameters in microwave component design and learn the measurement procedure of various microwave parameters.
					CO-5	Understand the mechanism of light propagation through Optical Fibres.
57	IV/I	R-22	RADAR SYSTEMS	EC731PE	CO-1	Demonstrate the CW and FMCW Radars, MTI
					CO-2	Evaluate radar Signals in Noise.
					CO-3	Design of radar system with the knowledge of Radar Equation.
					CO-4	Understand the tracking of radar, its range, phase and scanning parameters.
					CO-5	Design of Matched filter to extract radar signals in noise.
58	IV/I	R-22	SATELLITE COMMUNICATIONS	EC742PE	CO-1	Explore the basic concepts and frequency allocations for satellite communication, orbital mechanics and launch vehicles
					CO-2	Envision the satellite sub systems and design satellite links for specified C/N
					CO-3	Familiarize the various multiple access techniques for satellite communication systems and earth station technologies
					CO-4	Known the concepts of LEO, GEO Stationary Satellite Systems and satellite navigation
					CO-5	Understand the concept of Satellite Navigation
59	IV/I	R-22	PYTHON PROGRAMMING	OE723OE	CO-1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
					CO-2	Demonstrate proficiency in handling Strings and File Systems.
					CO-3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
					CO-4	Interpret the concepts of Object-Oriented Programming as used in Python.
					CO-5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

					CO-1	Inculcate moral values and become and socially responsible citizens of the society
60	IV/I	R-22	Professional Practice, Law & Ethics	EC702PC	CO-2	Sense of right and wrong based on the moral philosophy and spirituality of our tradition
					CO-3	Aware of the problems of modern society and to make them understand the need for them as engineers and responsible citizens
					CO-4	Follow professional ethics and ethical practices in their profession
					CO-5	Sense of responsibility for the mankind and the need to practice harmonious and synergetic way of life respecting nature, environment and values
61	IV/I	R-22	Microwave and Optical Communications Lab	EC703PC	CO-1	Verify characteristics of Reflex Klystron.
					CO-2	Analyze various parameters of Waveguide Components.
					CO-3	Estimate the power measurements of RF Components such as directional Couplers.
					CO-4	Demonstrate characteristics of various optical sources.
					CO-5	Measure data Rate, Numerical Aperture and Losses in Optical Link.
62	IV/I	R-22	Project Stage - I	EC704PC	CO-1	Demonstrate the technical knowledge of their selected project topic.
					CO-2	Undertake problem identification, formulation and solution.
					CO-3	Design engineering solutions to complex problems utilizing a systems approach.
					CO-4	Work with practicing engineers
					CO-5	Demonstrate the knowledge and skills acquired during the course work
63	IV/II	R-22	MACHINE LEARNING	EC853PE	CO-1	Ability to understand the concepts of Neural Networks
					CO-2	Ability to select the Learning Networks in modeling real world systems
					CO-3	Ability to use an efficient algorithm for Deep Models
					CO-4	Ability to apply optimization strategies for large scale applications
					CO-5	Ability to understand the concepts of Graphical Models
66	IV/II	R-22	System on Chip Architecture	EC862PE	CO-1	Understand the operation of conventional and renewable electrical power generating stations.
					CO-2	Evaluate the power tariff methods and Economics associated with power generation.
					CO-3	Analyze the operations of AIS & GIS, Insulators and Distribution systems.
					CO-4	Able to develop the understanding of contingency Analysis.
					CO-5	Able to develop programs for power system studies.
67	IV/II	R-22	ELECTRONIC SENSORS	EC721OE	CO-1	Learn about sensor Principle, Classification and Characterization.
					CO-2	Explore the working of Electromechanical, Thermal, Magnetic radiation and Electro analytic sensors
					CO-3	Understand the basic concepts of Smart Sensors
					CO-4	Design a system with sensors.
					CO-5	Design smart sensors

68	IV/II	R-22	Project Stage – II including Seminar	EC801PC	CO-1	Develop comprehensive solution of issues identified in project stage-1 and to meet the requirements as stated in project brief.
					CO-2	Synthesize the results of the detailed analytical studies conducted, lay down validity and design criteria, interpret the result for application to the problem, develop the concept and detailed design solution and to effectively communicate the thesis rationale.
					CO-3	Demonstrate the knowledge, skills and attitudes of a professional engineer.
					CO-4	Communicate with engineers and the community at large in written an oral forms.
					CO-5	Able to write effective technical report and demonstrate through presentation