

G.Narayanamma Institute of Technology and Science

AUTONOMOUS

DEPARTMENT OF ECE

COURSE OUTCOMES FROM ALL THE COURSES OF GNR-18 REGULATIONS

Course Name	CO Number	CO Statement	BT level
C101 (Physics) BS111AC	CO		
	C101.1	Realize the importance of light interaction with matter and its effects of superposition.	L4
	C101.2	Understand the quantum mechanical behavior of particles in different field environments.	L5
	C101.3	Distinguish materials on the basis of their electric and magnetic behavior and their applications.	L2
	C101.4	Estimate the carrier concentration of different types of semiconductors and be able to understand the working of optoelectronic devices.	L3
	C101.5	Realize the importance of Lasers in engineering fields.	L4
C102 (Linear Algebra and Multivariable Calculus) BS111AB	CO		
	C102.1	Classify the signals and sequences, introduce the orthogonality in signals and approximate signals using orthogonal functions.	L4
	C102.2	Analyze the spectral characteristics of continuous-time/ discrete-time periodic and aperiodic signals using Fourier analysis.	L4
	C102.3	Classify the continuous and discrete systems, represent LTI systems and analyze the characteristics of systems.	L4
	C102.4	Apply sampling theorem and describe the practical reconstruction techniques.	L3
	C102.5	Analyze the continuous time systems and discrete time systems using convolution integral and convolution sum respectively.	L4
C103 (Programming for Problem solving) ES111AF	CO		
	C103.1	Formulate and translate algorithms for arithmetic and logical problems to programs (in C language).	L6
	C103.2	Test and execute the programs and correct syntax and logical errors.	L3
	C103.3	Implement conditional branching, iteration and recursion.	L3
	C103.4	Decompose a problem into functions and synthesize a complete program.	L4
	C103.5	Use arrays, pointers and structures to formulate programs.	L3
C104 (Engineering Graphics)ES111AE	CO		
	C104.1	Know and Understand the conventions and methods of Engineering Graphics.	L2
	C104.2	Construct the conics using different methods and cycloidal curves.	L6
	C104.3	Draw and understand about orthographic projections of points, straight lines and planes.	L2
	C104.4	Improve visualization skills in different types of solids.	L2
	C104.5	Draw and understand about the development of surfaces of various solids.	L2
C105 (Engineering Workshop)ES11104	CO		
	C105.1	Demonstrate and understand the Engineering workshop safety regulations.	L2
	C105.2	Identify and use marking tools, measuring equipment and to work to prescribed accuracies.	L1
	C105.3	Know various operations in basic engineering workshops .	L2
	C105.4	Understand the practical difficulties encountered in industries during any assembly work.	L2
	C105.5	Do simple electrical work through their carrier.	L3
C106 (Physics Lab)ES11102	CO		
	C106.1	Handle different measuring instruments and asses their accuracy of measurement.	L1
	C106.2	Experiment and analyze the results to derive valid conclusions.	L4
	C106.3	Compare the experimental results with those introduced in lecture ,draw relevant conclusions and substantiate.	L5
	C106.4	Develop the experimental skills to design new experiments in engineering.	L3
	C106.5	Understand the ethics of working environment and deliver the results in time.	L2
C107 (Programming Lab)ES11105	CO		
	C107.1	Compile, debug and test the program.	L3
	C107.2	Apply the knowledge in C to write modular, structured programs in solving real world problems.	L3
	C107.3	Design programs to solve mathematical and scientific problems.	L6
	C107.4	Write structured programs using control structures and functions.	L1
	C107.5	Demonstrate usage of pointers and structures.	L2
C109 (Chemistry)BS112AA	CO		
	C109.1	Analyze microscopic chemistry in terms of atomic and molecular orbitals.	L5
	C109.2	Students will gain the basic knowledge of electrochemical procedures related to corrosion and its control.	L3
	C109.3	Rationalize periodic properties such as ionization potential, electronegativity and oxidation states.	L2
	C109.4	Students can develop and apply the concepts to identify the hardness and boiler troubles of water.	L2
	C109.5	List major chemical reactions that are used in the synthesis of drugs.	L1
C110 (Numerical Techniques and Transform Calculus) BS112AG	CO		
	C110.1	Find the root of the equation and solution of a system of equations.	L 1
	C110.2	Fit a curve for the given data.	L 2
	C110.3	Find the Numerical solutions for a given first order initial value problem.	L 3
	C110.4	Use Laplace Transform techniques for solving ODE's.	L 3
	C110.5	Verify the irrotational and solenoidal fields and find the potential function.	L 4
C111 (English)HS112AJ	CO		
	C102.1	Read complex texts actively comprehending the literal and figurative use of language and be able to read in-between the lines.	L 2
	C102.2	Write grammatically correct sentences and coherently well- developed paragraphs.	L 3
	C102.3	Apply the reading techniques and comprehend the passages critically.	L 3
	C102.4	Use appropriate vocabulary in the given context.	L 3
	C102.5	Appreciate how different genres use language and shape meanings.	L 5
C112 Basic Electrical Engineering)ES112AI	CO		
	C112.1	Analyze the basic circuits with application of Network Reduction Techniques and Network Theorems	L3
	C112.2	Understand and analyze magnetic circuits.	L2
	C112.3	Analyze the working principles of electrical machines and power converters	L3
	C112.4	Understand the components of low voltage electrical installations.	L3
	C112.5	Apply the above conceptual theories to real world Electrical & Electronic problems and applications.	L4
C113.1	CO		
	C113.1	The student is expected to learn from this laboratory course the concept of error and its analysis.	L2

C113 (Chemistry lab)BS11207	C113.2	Students can demonstrate writing skills and can derive valid conclusions.	L5
	C113.3	Students can compare the experimental results with those introduced in Lecture, draw relevant conclusions and substantiate	L3
	C113.4	Students can learn the ability to prepare advanced drug.	L4
	C113.5	Work on time reactions, thereby get in-depth knowledge on chemical kinetics.	L2
	C113.6	The course allows the students to develop and design new experimental	L6
C114 (English Professional and Communication Skills Lab) HS11212	CO		
	C114.1	Differentiate between the letters of alphabet and the phonetic symbols.	L2
	C114.2	Demonstrate the right pronunciation of the words in English using phonetic transcription and word stress.	L2
	C114.3	Speak with the proper intonation, voice modulation and tonal groups.	L6
	C114.4	Demonstrate the listening skills through language modules.	L2
	C114.5	Speak with clarity and confidence individually and in groups to discuss and present the topics chosen and understand the nuances of team dynamics.	L6
C115 (Basic Electrical Engg Lab) ES11209	C114.6	Work individually and in teams present the topics and demonstrate their public speaking skills and presentation skills through various aids like posters, PPTs etc.,	L2
	CO		
	C115.1	Identify & use basic measuring instruments and their usage.	L3
	C115.2	Verify different network theorems with dc excitation	L3
	C115.3	Carry out analysis of simple circuits with dc excitation	L2
	C115.4	Analyze bridge rectifiers	L3
	C115.5	Identify power converters.	L4
C115.6	Identify different electrical machines & their characteristics.	L3	
C116 (Computational Mathematics Lab) ES11210	CO		
	C116.1	Write Flow chart and algorithm for the given program.	L6
	C116.2	Have the ability to write C programs to solve specified problems.	L2
	C116.3	Find the root of a given equation using C program.	L3
	C116.4	Use arrays as part of the software solution.	L3
	C116.5	Utilize pointers to efficiently solve problems.	L3
	C116.6	Use functions from the portable C library.	L1
C201 (Mathematical Analysis) BS113AK	CO		
	C201.1	Express an infinite series representation of periodic function in terms of the trigonometric sine and cosine functions	L4
	C201.2	Solve first order partial differential equations.	L3
	C201.3	Understand about analyticity of complex functions and its properties.	L2
	C201.4	Integrate a complex valued function in a given region	L3
	C201.5	Expand a complex function in a given region of convergence using Taylor's and Laurent's series	L4
	C201.6	6. Applying knowledge of complex integrals for evaluation of real integrals.	L3
C202 (Network Theory)ES113AQ	CO		
	C202.1	Recognize the concepts of RMS, Average values.	L2
	C202.2	Analyze the given network using Theorems, Transient, Laplace transform and Network topology.	L4
	C202.3	Distinguish between Series and Parallel resonance.	L4
	C202.4	Classify a given network in terms of different two port network parameters.	L4
	C202.5	Develop the network from the Network functions.	L6
C202.6	Design different Passive filters.	L6	
C203 (Electronic Devices and Circuits) PC113AW	CO		
	C203.1	Illustrate the fundamental behavior of various diodes and transistors.	L2
	C203.2	Examine the construction, operation and characteristics of BJT, JFET and MOSFET.	L2
	C203.3	Analyze the various amplifier circuits using small signal hybrid model.	L4
	C203.4	Identify various biasing techniques.	L3
	C203.5	Distinguish between Positive and Negative feedback circuits.	L5
C203.6	Apply the knowledge of Diodes in designing circuits like rectifiers.	L3	
C204 (Signals & Systems)PC113AY	CO		
	C204.1	Classify the signals and sequences, introduce the orthogonality in signals and approximate signals using orthogonal functions.	L4
	C204.2	Analyze the spectral characteristics of continuous-time/ discrete-time periodic and aperiodic signals using Fourier analysis.	L4
	C204.3	Classify the continuous and discrete systems, represent LTI systems and analyze the characteristics of systems.	L4
	C204.4	Apply sampling theorem and describe the practical reconstruction techniques.	L3
	C204.5	Analyze the continuous time systems and discrete time systems using convolution integral and convolution sum respectively.	L4
C204.6	Apply Laplace transform techniques to analyze continuous-time signals and systems.	L3	
C205 (Digital System Design)PC113AT	CO		
	C205.1	Explore fundamental concepts and techniques involved in the design of digital circuits.	L2
	C205.2	Comprehend the concepts to design basic combinational and sequential circuits.	L3
	C205.3	Demonstrate building of various designs using basic digital blocks.	L3
	C205.4	Design complex digital systems using simpler digital subsystems.	L6
	C205.5	Verify the digital designs for required functionality.	L4
C205.6	Provide solutions for various required specifications in the form of digital designs.	L3	
C206 (Electronic Circuits Lab)PC11322	CO		
	C206.1	Illustrate the utility of various semiconductor devices, passive elements, circuit behavior and parameters to be estimated. 23. 4. Design, develop and test BJT and FET amplifier circuits with/without feedback and estimate the Amplifier parameters. 5. 6.	L2
	C206.2	Identify specifications, choice of device and equipment required, develop of the circuit and measurement of various diodes and transistor circuit characteristics.	L1
	C206.3	Set up different types of rectifier and oscillator circuits and estimate of their performance characteristics.	L4
	C206.4	Design, develop and test BJT and FET amplifier circuits with/without feedback and estimate the Amplifier parameters.	L6
	C206.5	Compare the experimental results with theoretical results, explain the parameters involved and justify the results obtained.	L2
C206.6	Interpret the results for further development of circuit features and subsequent applications Classify various power amplifier circuits in terms of their functionality.	L2	
C207 (Basic Simulation Lab)ES11314	CO		
	C207.1	Understand fundamental concepts & usage of MATLAB simulation software using Communications & Signal processing toolboxes.	L2
	C207.2	Identify the specifications, requirements & built in functions to generate different kinds of signals & sequences and mathematical operations involving them.	L5
	C207.3	Develop MATLAB code for designing various filters and verifying the properties of LTI system.	L6
	C207.4	Develop MATLAB code for analyzing Fourier and Laplace transforms and their utility.	L6
	C207.5	Develop MATLAB code for Fourier analysis of Discrete sequences.	L6
C207.6	Generate relevant simulation codes, with and without usage of built in functions & estimation of the numerical results with supporting plots.	L6	

	CO		
	C208.1	Develop the concepts in combinational and sequential circuits.	L.2
	C208.2	Generate clock frequency and plot the transfer characteristics of inverter using NAND & NOR gates.	L.2
	C208.3	Analyze the simple combinational circuits using different digital ICs.	L.3
	C208.4	Design the higher order sequential circuits using lower order digital circuits.	L.6
	C208.5	Verify the output of the digital circuits with respect to truth tables.	L.3
	C208.6	Interpret and verify the digital circuits based on the fundamental properties.	L.3
	CO		
	C209.1	Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.	L.5
	C209.2	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.	L.2
	C209.3	Students will acquire insight into the gendered division of labour and its relation to politics and economics.	L.2
	C209.4	Men and women students and professionals will be better equipped to work and live together as equals.	L.3
	C209.5	Students will develop a sense of appreciation of women in all walks of life.	L.6
	C209.6	Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.	L.5
	CO		
	C210.1	Comprehend the random variables, vectors and processes	L.2
	C210.2	Analyze the use of multiple random variables and relate them to communication engineering problems	L.4
	C210.3	Evaluate and apply moments & characteristic functions, inequalities and significance of Central Limit Theorem.	L.5
	C210.4	Present the concept of Correlation, Power Density Spectrum and their properties.	L.3
	C210.5	Explore relation between the output, input and Impulse Response of LTI system with respect to various statistical characteristics	L.4
	C210.6	Create mathematical models for practical design problems and determine theoretical solutions to the created models.	L.6
	CO		
	C211.1	Identify crystal structure for various materials	L.1
	C211.2	Understand the mechanical properties of metals	L.2
	C211.3	Classify the metals and their applications	L.4
	C211.4	Assess the thermal and electrical properties of metals	L.5
	C211.5	Classify the Nonmaterial and properties	L.4
	C211.6	Analyze the economic, environmental and social issues in material science	L.4
	CO		
	C212.1	Classify various power amplifier circuits in terms of their functionality.	L.4
	C212.2	Distinguish between Linear and Non-linear Wave shaping circuits.	L.4
	C212.3	Analyze the operation of OP-AMP, Multivibrator and 555 Timer	L.4
	C212.4	Design different types of Multivibrator circuits.	L.6
	C212.5	Demonstrate various applications of op-amps.	L.2
	C212.6	Illustrate the performance of ADC and DAC	L.2
	CO		
	C213.1	Analyze different modulation and demodulation schemes for Analog & digital communications	L.4
	C213.2	Evaluate fundamental communication system parameters such as bandwidth, power, signal to quantization noise ratio and figure of merit.	L.5
	C213.3	Design Analog & Digital communication systems to meet desired needs.	L.6
	C213.4	Elucidate the design tradeoffs and performance of Analog and Digital communication systems.	L.2
	C213.5	Calculate error rate, spectral efficiency of baseband data transmission systems.	L.3
	C213.6	Analyze the concept of source coding and channel coding techniques.	L.4
	CO		
	C214.1	Familiarise with internal architecture and organization of 8086 and 8051	L.1
	C214.2	Write assembly language programs using 8086 and 8051	L.3
	C214.3	Design and Develop microcontroller based system using 8051 interfacing	L.6
	C214.4	Apply the knowledge of 8051 microcontroller in real time applications	L.3
	C214.5	Relate the memory organization and memory interface with 8086/8051	L.4
	C214.6	Discuss Various serial communication interface standards	L.2
	CO		
	C215.1	Illustrate the utility of various modes of 555 timers, applications of semiconductor devices and Op-Amps.	L.2
	C215.2	Identify different types of DACs.	L.1
	C215.3	Set up circuits to interpret the different applications of Op-Amps.	L.2
	C215.4	Design, develop and test nonlinear wave shaping, Multivibrators, Amplifier circuits and estimate the relevant parameters.	L.6
	C215.5	Compare the experimental results with theoretical results, explain the parameters involved and justify the results obtained.	L.2
	C215.6	Interpret the results for further development of circuit features and subsequent applications Classify various power amplifier circuits in terms of their functionality.	L.2
	CO		
	C216.1	Analyze the Analog Modulation schemes, circuit schematics and the parameters to be evaluated experimentally.	L.4
	C216.2	Develop and implement MATLAB codes for various Analog Modulation schemes and estimate parameters from simulation results.	L.6
	C216.3	Analyze and implement Digital Modulation schemes and verify the same by simulating in MATLAB.	L.4
	C216.4	Comprehend the concept of Time Division Multiplexing and Pulse modulation schemes	L.3
	C216.5	Demonstrate the Sampling and reconstruction of base band signals	L.2
	C216.6	Analyze the spectrum of Analog/Digital Modulated signals	L.4
	CO		
	C217.1	Familiarise with internal architecture and organization of 8086 and 8051	L.1
	C217.2	Write assembly language programs using 8086 and 8051	L.3
	C217.3	Design and Develop microcontroller based system using 8051 interfacing	L.6
	C217.4	Apply the knowledge of 8051 microcontroller in real time applications	L.3
	C217.5	Relate the memory organization and memory interface with 8086/8051	L.4
	C217.6	Discuss Various serial communication interface standards	L.2
	CO		
	C218.1	Benefited by various ecological principles and environmental regulations for sustainable development.	L.2
	C218.2	Able to identify/analyze/evaluate/demonstrate the consequences of developmental activities and mitigation measures.	L.5
	C218.3	Develop the advanced technologies in protection/conservation of resources in sustainable approach.	L.6
	C218.4	Improved in attitude & thinking of the students will be positively towards earth & environment	L.2
	C218.5	Benefited by knowing the concepts like Green Buildings, Low Carbon Lifestyle, International conventions etc.	L.2
	C218.6	It helps the students to improve the quality of life.	L.1

C319 (Linear Control System)PC116DC	C319.3	Analyze 1st and 2nd order systems with different inputs and design in time domain for a given specifications.	L4
	C319.4	Apply appropriate techniques such as Nyquist and Bode plot in frequency domain to determine and improve the stability of a system.	L3
	C319.5	Design different types of compensators for feedback control systems to improve system performance.	L6
	C319.6	Apply state space analysis to solve problems on continuous control systems.	L3
	CO		
C320 (Antennas and Wave Propagation) PE116CQ	C320.1	Explain the mechanism of radiation, distinguish between different antenna characteristic parameters, establish their mathematical relations, and estimate them for different practical cases. Distinguish between short dipoles, half-wave dipoles, quarter-wave monopoles and small loops, configure their current distributions, derive their far fields and radiation characteristics and sketch their patterns.	L2
	C320.2	Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of folded dipole, YagiUda Antenna, Helical Antennas, Horn Antennas, and to acquire the knowledge of their analysis, design and development.	L6
	C320.3	Analyze a microstrip rectangular patch antenna and a parabolic reflector antenna, identify the requirements and relevant feed structure, carry out the design and establish their patterns.	L6
	C320.4	Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory.	L5
	C320.5	Carry out the Linear Array Analysis, estimate the array factor and characteristics and sketch the pattern for 2-element array, N-element BSA, EFA, Binomial Arrays.	L2
	C320.6	Classify the different wave propagation mechanisms, identify their frequency ranges, determine the characteristic features of ground wave, ionospheric wave, space wave, duct and tropospheric propagations, and estimate the parameters involved.	L2
C321 (Speech and Audio Signal Processing) PE116DK	CO		
	C321.1	Model an Electrical Equivalent of Speech Production System.	[L3]
	C321.2	Feature extraction of the LPC coefficients to Synthesize or Compress the Speech.	[L4]
	C321.3	Analyze the speech signal in cepstrum domain for extraction of Pitch and Formants etc.	[L4]
	C321.4	Design a Homomorphic Vocoder for coding and decoding of Speech.	[L6]
	C321.5	Enhance the speech using various Filters.	[L3]
	C321.6	Design basic audio coding methods for coding the audio signal.	[L6]
C322 (Bio-Medical Electronics)PE116CS	CO		
	C322.1	Describe the functioning of human physiological systems.	L2
	C322.2	Understand the origin of Bioelectric Potential and their measurements using electrodes and transducers.	L3
	C322.3	Explore the applications of the electronic systems in biological and medical applications namely the ECG, EMG and EEG machines.	L4
	C322.4	Analyze the biological processes like other electronic processes and measure non-electrical parameters of human system.	L5
	C322.5	Examine the various medical imaging techniques and discuss about therapeutic and assist devices.	L6
	C322.6	Evaluate the practical limitations on the electronic components while handling bio-substances.	L4
C323 (Computer Networks Lab) PC11644	CO		
	C323.1	Understand working of different TCP/IP protocols.	L2
	C323.2	Simulate simple LAN, WAN network models with multiple scenarios, collect statistics on network performance.	L5
	C323.3	Apply mathematical foundation to understand the fundamental relationship between packet loss probability and TCP performance.	L3
	C323.4	Analyze the performance of different switching techniques, routing protocols.	L4
	C323.5	Compare different switching schemes.	L4
C324 (Electronic Design Lab) PC11645	CO		
	C324.1	Connect and control the data from or to Sensors/Output devices using Aurdino.	L2
	C324.2	Simulate, synthesize, implement and analyse combinational and sequential logic circuits.	L3
	C324.3	Interpret the results for further development of circuit features and subsequent applications.	L3
	C324.4	Simulate the different modulation schemes in SDR/MATLAB/Lab View	L4
	C324.5	Analyse and understand Analog/digital modulation concepts in study of SNR Vs BER.	L4
C325 (Seminar)PW11652	CO		
	C325.1	Research literature to identify the latest trends in engineering and choose state of art technology to deliver a seminar.	L4
	C325.2	Demonstrate effectively the ideas presented in engineering technologies to engineering community and with society at large.	L3
	C325.3	Summarize the ideas involved in different engineering technologies in a precise and succinct manner.	L2
	C325.4	Engage in meaningful discussion about state of art technologies for efficient knowledge transfer.	L3
C401 (Fundamentals of Management) HS117EC	CO		
	C401.1	Associate the concept of Management in practical scenario for effective decision making.	L3
	C401.2	Synthesize the preparation of effective plans in strategizing the decision making process.	L5
	C401.3	Circumscribe the authority responsibility conduct in an organization.	L2
	C401.4	Intuit the human resource management in an organization towards achievement of effectiveness.	L4
	C401.5	Cognize the role of leader and motivation in the attainment of objectives of an organization.	L2
C402 (Microwave Engineering)PC117EJ	CO		
	C402.1	To analyze completely the rectangular waveguides and their mode characteristics and apply them for solving practical microwave transmission line problems.	L4
	C402.2	To distinguish between the different types of waveguide and ferrite components, explain their functioning and select proper components for engineering applications.	L4
	C402.3	To distinguish between the methods of power generation at microwave frequencies, establish the performance characteristics of 2-Cavity and Reflex Klystrons, Magnetrons, TWTs and estimate their efficiency levels, and solve related numerical problems	L4
	C402.4	To realize the need for solid state microwave sources, understand the concepts of TEDS, RWH Theory and explain the salient features of Gunn Diodes and ATT Devices	L2
	C402.5	To establish the properties of Scattering Matrix, formulate the S-Matrix for various microwave junctions, and understand the utility of [S]parameters in microwave component design	L5
C403 (Digital Image and video Processing) PE117DS	CO		
	C403.1	Analyze the need for various advanced image transforms, types and their properties.	L4
	C403.2	Apply different techniques used for enhancement of images both in spatial, frequency domain and also use basic segmentation algorithms.	L2
	C403.3	Explore image degradation function, model few basic degradation functions to obtain restored image.	L5
	C403.4	Comprehend the different Color models and basics of Color Image processing.	L4
	C403.5	Study and Compare the various image coding techniques used for image compression	L2
C404 (Low Power VLSI Design)PE117EH	CO		
	C404.1	Identify the types of power dissipation in MOSFET devices and understand its impact on system performance and reliability.	L3
	C404.2	Understand various sources of power dissipation in CMOS devices.	L2
	C404.3	Analyze different circuit techniques for dynamic power reduction.	L4
	C404.4	Categorize different circuit techniques for static power reduction.	L6
	C404.5	Analyze the power dissipation in low-power arithmetic circuits.	L4
C404.6	Examine the power dissipation in very fast dynamic logic circuits such as latches and flip-flops	L6	
	CO		

Principles of Wireless Communication PE117GH	C405	C405.1	Independently understand basic computer network technology, different types of network topologies and protocols.	L2
		C405.2	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.	L1
		C405.3	Identify the different types of network devices and their functions within a network.	L3
		C405.4	Understand and building the skills of subnetting and routing mechanisms.	L2
		C405.5	Acquaint with the knowledge of various routing protocols.	L2
		C405.6	Familiarity with various types of messages being exchanged at different layers of an Internet.	L1
C406 (Artificial Intelligence) PE117DN		CO		
		C406.1	To Understand the basics of AI and knowledge representation using appropriate technique.	L2
		C406.2	Apply AI techniques for problem solving using various search and game playing algorithms	L3
		C406.3	To interpret architectures of different intelligent agents and Expert Systems.	L4
		C406.4	Able to interpret probabilistic and logical reasoning for knowledge	L5
		C406.5	To analyze different Machine Learning approaches for problem solving	L6
C407 Fiber Optic Communications)PE117E		C406.6	Ability to recognize basics of Natural Language Processing.	L5
		CO		
		C407.1	Demonstrate an understanding of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.	L2
		C407.2	Estimate the signal degradations and of an optical signal in different types of fibers	L5
		C407.3	Analyze various types of optical sources and switches and their functionalities	L4
		C407.4	Compare the characteristics of optical detectors	L2
C408 (Embedded System Design)PE117DX		C407.5	To assess the different techniques to improve the capacity of the system	L5
		C407.6	Analyse the non linear effects of fiber optic links	L4
		CO		
		C408.1	Explain the basic characteristics of general computing systems and embedded systems	L2
		C408.2	Describe the Core of the Embedded System with peripherals	L3
		C408.3	Compare and distinguish memories, general purpose processors and domain specific purpose processors.	L3
C409 (Microwave Engineering Lab) PC11757		C408.4	Learn the method of designing an Embedded System for any type of applications	L4
		C408.5	Introduce concepts of Real-Time Operating Systems	L3
		C408.6	Design and implement an embedded system using RTOS.	L6
		CO		
		C409.1	Relate the functionality of each microwave component and distinguish between different microwave sources	L2
		C409.2	Classify and specify microwave components needed for each experiment	L2
C410 (Mini Project)PW11758		C409.3	Distinguish and overcome the errors associated with microwave measurements taking necessary precautions	L4
		C409.4	Model a microwave bench set up for any type of microwave lab measurement in X- band	L3
		C409.5	Design a set output for antenna pattern measurement and compare the experimental results with theoretical ones and justify the results obtained	L5
		C409.6	Interpret the results for further development of applications	L5
		CO		
		C410.1	Research literature to identify existing solutions to practical engineering problems and gain insight into new and better ways of solving it.	L4
C411 (Project Phase I)PW11761		C410.2	Demonstrate effectively the solutions to complex engineering problems to the engineering community and with society at large.	L3
		C410.3	Implement solutions for complex engineering problems and design system components or processes that meet the specified requirements.	L6
		C410.4	Document the complete design cycle in a precise and succinct manner.	L5
		C410.5	Work as a part of diverse team to deliver best quality deliverables.	L3
		CO		
		C411.1	Research literature to identify existing solutions to practical engineering problems and gain insight into new and better ways of solving it.	L4
C418 Entrepreneurship and Project Management HS118FK		C411.2	Demonstrate effectively the solutions to complex engineering problems to the engineering community and with society at large.	L3
		C411.3	Implement solutions for complex engineering problems and design system components or processes that meet the specified requirements.	L6
		C411.4	Document the complete design cycle in a precise and succinct manner.	L5
		C411.5	Work as a part of diverse team to deliver best quality deliverables.	L3
		CO		
		C418.1	Possess sensibleness and skills required for establishment of business.	L3
C419 (Global Navigation Satellite Systems) PE118FL		C418.2	Construe the entrepreneurial ingenuity required for business functioning.	L5
		C418.3	Give perception on the probable business structures for entrepreneurial decisions	L4
		C418.4	Scrutinize the probable financial propositions in investment process.	L5
		C418.5	Evaluate the entrepreneurial project feasibility of implementation and its profitability.	L5
		C418.6	Delve the market for the product developed through entrepreneurial establishment	L6
		CO		
C420 Adaptive Signal Processing)PE118E		C419.1	Explain the operation of basic satellite communication.	L2
		C419.2	Differentiate between various GNSS constellations and describe the three GNSS segments and explain the signal structure of GNSS.	L2
		C419.3	Frame various coordinate systems for estimating position.	L2
		C419.4	Estimate the various errors and their effect on position estimation.	L2
		C419.5	Determine user position from Navigation and Observation data formats.	L6
		C419.6	Apply DGPS principle and can also analyze various augmentation systems.	L4
C421 (Radar Systems)PE118FW		CO		
		C420.1	Introduce some practical aspects of signal processing, and in particular adaptive systems.	L1
		C420.2	Differentiate random variables and random processes, covariance matrices; Z transforms of stationary random processes.	L2
		C420.3	Describe error surfaces and minimum mean square error, principle of orthogonality	L1
		C420.4	Formulate discrete time Wiener filter as constrained optimization problem.	L3
		C420.5	Analyze steepest descent - convergence issues; Stochastic gradient descent LMS and RLS, its convergence case study.	L4
C422 (Internet of Things)PE118FS		C420.6	Formulate the Kalman filter.	L3
		CO		
		C421.1	Explain the working principle of a pulse radar and establish the complete radar range equation, identifying the significance and choice of all parameters involved, and solve numerical problems to establish the radar characteristics.	L3
		C421.2	Account for the need and functioning of CW, FM-CW and MTI radars, identifying the complete block diagrams and establishing their characteristics.	L2
		C421.3	Illustrate the DLC characteristics, account for the range gated Doppler filter bank, and estimate the MTI radar performance characteristics and limitations.	L2
		C421.4	Distinguish between Sequential Lobbing, Conical Scan, Mono-pulse type of Tracking Radars, specify their requirements and compare their characteristic features.	L4
C422		C421.5	Derive the matched filter response characteristics for radar applications and account for correlation receivers; to distinguish between different radar displays and duplexers.	L5
		C421.6	Account for the electronic scanning principle, and implement the same through phased array antennas, knowing their requirements and utilities.	L6
		CO		
		C422.1	Understand the IoT Systems.	L3
		C422.2	Understand the concept of M2M (machine to machine) with necessary protocols.	L4
		C422.3	Create programs using python scripting language in IoT devices.	L5
C422		C422.4	Create programs for Raspberry Pi interfaces.	L5
		C422.5	Understand to communicate with IoT Systems through web-interface.	L4
		C422.6	Apply IoT principles for domain specific applications	L2
		CO		

C423 (Adhoc Wireless Networks)PE118EZ	CO		
	C423.1	To provide the knowledge on various concepts related to WLANS and wireless adhoc networks	L1
	C423.2	To give an overview of the designing issues of MAC, Routing and Transport protocols of Adhoc Networks	L2
	C423.3	To provide in depth analysis of various MAC, Routing and Transport protocols and their performance evaluation.	L5
	C423.4	To inculcate regarding the security issues in Adhoc networks.	L6
	C423.5	To provide analysis of energy management in Adhoc networks.	L4
C424 (Artificial Neural Networks) PE118FE	CO		
	C424.1	To Understand the basics of AI and knowledge representation using appropriate technique.	[L2]
	C424.2	Apply AI techniques for problem solving using various search and game playing algorithms	[L3]
	C424.3	To interpret architectures of different intelligent agents and Expert Systems.	[L4]
	C424.4	Able to interpret probabilistic and logical reasoning for knowledge	[L5]
	C424.5	To analyze different Machine Learning approaches for problem solving	[L6]
C425 (Project Phase II)PW11863	C424.6	Ability to recognize basics of Natural Language Processing.	[L5]
	CO		
	C425.1	Research literature to identify existing solutions to practical engineering problems and gain insight into new and better ways of solving it.	L4
	C425.2	Demonstrate effectively the solutions to complex engineering problems to the engineering community and with society at large.	L3
	C425.3	Implement solutions for complex engineering problems and design system components or processes that meet the specified requirements.	L6
	C425.4	Document the complete design cycle in a precise and succinct manner.	L5
	C425.5	Work as a part of diverse team to deliver best quality deliverables.	L3
COURSE OUTCOMES FOR OPEN ELECTIVES FROM ECE DEPT			
C312 ic Electronics (OE115KC)	C312.1	Illustrate the fundamental behaviour of various diodes, transistors	L1
	C312.2	Explain the construction, operation and characteristics of BJT, JFET and MOSFET	L1
	C312.3	Analyse the various amplifier circuits using small signal hybrid model.	L3
	C312.4	Identify the necessity for biasing	L1
	C312.5	To know the operation of various special purpose devices like LED,photo diode ad SCR	L1
	C312.6	Apply the knowledge of Diodes in designing circuits like rectifiers	L3
8 Principles of Electronic Communication (OE116KL)	C328.1	Analyze the basic concepts of modulation and understand the different kinds of analog modulation techniques .	L4
	C328.2	Understand and analyze the different types of pulse analog and digital modulation systems.	L1
	C328.3	Describe the Telephone systems and network fundamentals.	L2
	C328.4	State the operative physical principle of launching satellites and explain the concept & operation of GPS.	L1
	C328.5	Comprehend about the principle of optical communication system, functioning of optical cables and wave division multiplexing. .	L1
	C328.6	Describe the cell phone operational concepts	L2
415 Telecommunication Switching and Sub Systems (OE117KU)	C415.1	Acquire knowledge about Telecommunication Switching Systems.	L1
	C415.2	Understand different Telecommunication switching and signaling methodologies	L1
	C415.3	Apply the concepts to solve the real time telecommunication problems	L3
	C415.4	Analyse the fundamental telecommunication traffic models.	L4
	C415.5	Evaluate telecommunication switching systems.	L5
	C415.6	Design a telecommunication switching system.	L6
8 Cellular Mobile Communications (OE118KZ)	C428.1	Analyze and design wireless and mobile cellular systems.	L4
	C428.2	Understand impairments due to multipath fading channel.	L1
	C428.3	Understand the fundamental techniques to overcome the different fading effects.	L1
	C428.4	Understand Co-channel and Non Co-channel interferences	L1
	C428.5	Familiar with cell coverage for signal and traffic, diversity techniques and mobile antennas.	L2
	C428.6	Understanding of frequency management, Channel assignment, and types of handoff.	L1
COURSE OUTCOMES FOR OPEN ELECTIVES FROM CSE DEPT			
7 FUNDAMENTALS OF DATA STRUCTURES (OE-1) OE115KA	C307.1	Analyse the time and space complexities of algorithms.	L4
	C307.2	Differentiate between linear and non-linear data structures.	L1
	C307.3	Use basic data structures such as linked list, stack and queue for data representation.	L2
	C307.4	Understand advanced data structures like binary trees, search trees and graphs.	L1
	C307.5	Choose appropriate data structures to represent data items in real world problems.	L1
	C307.6	Analyse various kinds of searching and sorting techniques.	L2
C308 JAVA PROGRAMMING (OE-1) OE115KB	C307.1	Analyse the time and space complexities of algorithms.	L4
	C307.2	Differentiate between linear and non-linear data structures.	L2
	C307.3	Use basic data structures such as linked list, stack and queue for data representation.	L3
	C307.4	Understand advanced data structures like binary trees, search trees and graphs.	L2
	C307.5	Choose appropriate data structures to represent data items in real world problems.	L4
	C307.6	Analyse various kinds of searching and sorting techniques.	L4
C324 OPERATING SYSTEMS (OE-2) OE116KJ	C324.1	Acquire a High-level understanding of what is an operating system and the role it plays and the services it provides.	L2
	C324.2	Understand process management concepts including scheduling, synchronization.	L2
	C324.3	Describe System model for deadlock, Methods for handling deadlocks.	L1
	C324.4	Understand of memory management including virtual memory.	L2
	C324.5	Acquire Knowledge on issues related to file system interface and implementation.	L2
	C324.6	Understand the issues related to disk management.	L2
C325 DATABASE MANAGEMENT SYSTEMS (OE-2) OE116KK	C325.1	Understand concepts and the applications of database systems and ability to implement in real time applications.	L2
	C325.2	Construct an Entity-Relationship (E-R) model from specifications and transform to relational model.	L6
	C325.3	Demonstrate the basic concepts of relational database management system and construct unary/binary/set/aggregate queries in Relational Algebra	L2
	C325.4	Apply normalization on database.	L3
	C325.5	Understand principles of database transaction management.	L2
	C325.6	Understand the storage and recovery of database	L2

C409 CYBER SECURITY (OE-3) OE117KR	C409.1	Understand the evolution of Internet in the context of emerging Cyber threats and their laws.	L2
	C409.2	Distinguish and classify the forms of Cybercriminal activities and Social Engineering methods used to undertake crimes.	L4
	C409.3	Apply risk management policies to protect organization's critical information and assets.	L3
	C409.4	Analyse the tools and methods used in Cybercrime.	L4
	C409.5	Understand the Security challenges for mobile and wireless devices.	L2
	C409.6	Assess the Cybercrime scenarios in India, Global and Legal Perspectives.	L5
C410 PYTHON PROGRAMMING (OE-3) OE117KS	C410.1	Gain knowledge on the basic principles of Python programming language.	L1
	C410.2	Understand different Decision Making statements and Functions.	L2
	C410.3	Apply the knowledge of data structures like Lists, Dictionaries and sets.	L3
	C410.4	Understand and summarize different File and exception handling operations.	L2
	C410.5	Implement object oriented concepts.	L3
	C410.6	Design GUI applications using Python.	L6
C411 ANDROID PROGRAMMING (OE-3) OE117KT	C411.1	Describe Android platform, Architecture and features.	L1
	C411.2	Design User Interface and develop activity for Android App.	L6
	C411.3	Use Intent, Broadcast receivers and Internet services in Android App.	L3
	C411.4	Design and implement Database Application and Content providers.	L6
	C411.5	Use multimedia, camera and Location based services in Android App.	L3
	C411.6	Discuss various security issues in Android platform.	L2
CIPLES OF ARTIFICIAL INTELLIGEN OE118KX	C423.1	Understand the basics of AI and knowledge representation using appropriate technique.	L2
	C423.2	Apply AI techniques for problem solving using various search and game Playing algorithms.	L3
	C423.3	Interpret architectures of different intelligent agents and Expert systems	L2
	C423.4	Interpret probabilistic and logical reasoning for knowledge.	L2
	C423.5	Analyse different Machine Learning approaches for problem solving.	L4
	C423.6	Recognize basics of Natural Language Processing.	L2
CLOUD COMPUTING (OE-4) OE118KY	C424.1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing.	L2
	C424.2	Illustrate the broad perceptive of cloud architecture and model.	L2
	C424.3	Apply and design suitable Virtualization concept.	L3
	C424.4	Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications	L4
	C424.5	Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application	L5
	C424.6	Analyze the various standards for Cloud computing and its management.	L4
COURSE OUTCOMES FOR OPEN ELECTIVES FROM BS DEPT			
Disaster Management (OE-1) OE115KH	CO -1	Understand different kinds of disasters and their vulnerabilities	L2
	CO - 2	Identify the causes, effects and mitigation measures of different disasters.	L1
	CO -3	Apply the disaster management mechanism in natural and man induced calamities.	L3
	CO -4	Analyse and solve the unforeseen situations with advanced technologies like Remote Sensing and Geological Information Systems	L5
Environmental Impact Assessment (OE-) OE118MC	CO -1	Understand the basic concepts of Environmental Impact Assessment, Environmental Impact Statement and Environmental Audit.	L2
	CO - 2	Identify the environmental aspects to be considered for the Environmental Impact Assessment study.	L1
	CO -3	Apply the knowledge of Environmental Impact Assessment studies in Preparation of Environmental Impact Statement.	L3
	CO -4	Prepare suitable methodology in Environmental Impact Assessment documentation.	L6
	CO -5	Analyse and evaluate the mitigation measures of developmental activities on environmental components	L5
COURSE OUTCOMES FOR OPEN ELECTIVES FROM H&M DEPT			
RODUCTION TO DATAANALYTICS (O OE115KF	CO1	1. Understand the definitions and concepts associated with central tendency and measures of dispersion.	L 2
	CO2	2. Find the probability of an event and know the properties of distribution.	L 1
	CO3	3. Determine the regression co-efficient and test the accuracy of co-efficient.	L 3
	CO4	4. Learn basic concepts in supervised learning.	L 1
	CO5	5. Attain basic knowledge in unsupervised learning.	L 2
	CO6	6. Understand past behavior of data and forecast the future behavior using time series analysis.	L 5
NTELLECTUAL PROPERTY RIGHTS OE115KG	CO1	1. Understand the dynamics and legalistic framework of IPR's	L 2
	CO2	2. Acquaint with securing patents and its protection.	L 5
	CO3	3. Seize the dimensions of Copy right protection.	L 2
	CO4	4. Realize the eminence of Trade Marks in growth of business.	L 3
	CO5	5. Essentials of safeguarding Industrial designs.	L 1
	CO6	6. Sustentation of Trade Secrets and aspects of IP audit.	L 4
L SKILLS AND PROFESSIONAL COM OE115KP	CO1	1. Communicate with more confidence and self-esteem.	L 2
	CO2	2. Give better presentation and explanation using digital aids and tools.	L 5
	CO3	3. Perform effectively and efficiently in the work place environment.	L 3
	CO4	4. Exhibit better tolerance and receptiveness in understanding and accepting diversity.	L 2
	CO5	5. Apply higher thinking order in the self-development process.	L 3
	CO6	6. Equip oneself to handle the work related challenges and conflicts professionally.	L 5
INDUSTRIAL MANAGEMENT OE117KW	CO1	1. Organize the activities of Business efficiently.	L 3
	CO2	2. Adapt to appropriate method of production yielding productivity.	L 6
	CO3	3. Identify efficient method of production.	L 3
	CO4	4. Handle inventory efficiently for improving Productivity.	L 3
	CO5	5. Implement and maintain Quality standards in Production.	L 5
	CO6	6. Cohere to dynamic practices to improve Productivity.	L 4
	CO1	1. Understand the importance of the Marketing Management Process	L 2

MARKETING MANAGEMENT OE118MB	CO2	2. Conduct Marketing Research, comprehend buyer behavior and hypothesize market segmentation.	L 4
	CO3	3. Identify the elements of product mix and pricing strategies.	L 3
	CO4	4. Enumerate strategies of pricing in fixation.	L 5
	CO5	5. Select appropriate network of product distribution.	L 3
	CO6	6. Adapt to befitting promotional strategy.	L 6
	COURSE OUTCOMES FOR OPEN ELECTIVES FROM MECH DEPT		
OPERATIONS RESEARCH OE115KE	CO1	Apply linear programming models to several Engineering Applications.	L 3
	CO2	Use several other techniques like Transportation, Assignment and Sequencing Models in the real world applications.	L 3
	CO3	Study selected Dynamic Programming models for real world situations.	L 4
	CO4	Apply simple mathematical models in Inventory into the real Engineering Applications.	L 3
	CO5	Solve Game theory problems related to business applications.	L 3
	CO6	Develop optimum replacement policy.	L 6
RESEARCH METHODOLOGY OE116KE	CO1	Evaluate current research and propose possible alternate directions for further work.	L 5
	CO2	Develop hypothesis and methodology for research.	L 6
	CO3	Ability to design good research.	L 6
	CO4	Ability to develop Research ethics and time management.	L 6
	CO5	Ability to develop tools for writing research report.	L 6
	CO6	Comprehend and deal with complex research issues in order to communicate their scientific results clearly for peer review.	L 5
COURSE OUTCOMES FOR OPEN ELECTIVES FROM EEE DEPT			
ELECTRICAL MATERIALS (OE-1) OE115KD	CO1	Distinguish between magnetic and non-magnetic materials by acquiring the knowledge of their atomic structures.	L2
	CO2	Analyse Dielectric and semiconductor materials.	L3
	CO3	Analyse the magnetic materials using their properties.	L3
	CO4	Identify special purpose materials for different applications.	L2
	CO5	Analyse the working of different materials from the point of view of their applications in electrical industry.	L4
	CO6	Analyse the working of special purpose materials from the point of view of their possible applications electrical & other fields.	L3
RENEWABLE ENERGY SOURCES (OE-2) OE116KM	CO1	Estimate the solar energy, Utilization of solar energy, Principles involved in solar energy collection and conversion of it to electricity generation	L2
	CO2	Explore the concepts involved in wind energy conversion system by studying its components, types and performance	L4
	CO3	Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications	L2
	CO4	Acquire the knowledge on Geothermal energy and it's harnessing methods	L3
	CO5	Illustrate ocean energy and explain the operational methods of their utilization.	L4
	CO6	Describe the concept of direct energy conversion and their types and working principle	L2
WASTE MANAGEMENT TECHNIQUES AND POWER GENERATION (OE-3) OE117KV	CO1	Understand technologies for generation of energy from solid waste.	L1
	CO2	Compare methods of solid waste disposal.	L2
	CO3	Identify sources of energy from waste using various conversion techniques.	L2
	CO4	Analyze methods for waste management.	L3
	CO5	Assess the harmful effects of e-waste.	L4
	CO6	Differentiate between the normal waste and e-waste.	L2
Robotics (OE-4) OE118MA	CO1	Identify a Robot for a specific application.	L2
	CO2	Identify parameters required to be controlled in a Robot.	L2
	CO3	To select suitable sensors and drive system for an application	L3
	CO4	To learn various robot programming methods and languages	L3
	CO5	To learn various industrial robot control systems and Mission Vision system	L3
	CO6	To understand Socio-Economic aspect of robotisation.	L3
PG			
PC101 (Advanced Digital System Design) 511B101	CO		
	PC101.1	Perform the arithmetic operations and code conversions.	L2
	PC101.2	Design and analyse combinational logic circuits.	L2
	PC101.3	Verify the timing analysis of sequential logic circuits.	L3
	PC101.4	Design finite state machines.	L3
	PC101.5	Design combinational systems using combinational blocks.	L4
	PC101.6	Analyse and Design sequential systems using sequential blocks.	L4
PC102 (Wireless Mobile Communication) 511B102	CO		
	PC102.1	Analyze wireless and mobile Cellular Communication systems over a stochastic fading channel.	L4
	PC102.2	Impart the concepts of Multiple Access Techniques.	L2
	PC102.3	Analyze the concepts of Mobile Radio Propagation, fading and diversity reception techniques.	L4
	PC102.4	Summarize the knowledge on digital cellular systems	L2
	PC102.5	Illustrate the knowledge on types of equalization techniques.	L1
	PC102.6	Apply the applications of Multiple Access Techniques.	L4
PC103 (VLSI Technology & Design) 511B103	CO		
	PC103.1	Construct NMOS, PMOS, CMOS, and Bi CMOS transistors using various fabrication technologies.	L6
	PC103.2	Analyze the quality metrics of combinational circuits.	L4
	PC103.3	Acquire the knowledge in advanced technologies.	L6
	PC103.4	Design combinational and sequential circuits.	L6
	PC103.5	Analyze power dissipation and delays in sequential circuits.	L4
	PC103.6	Familiarize with the concepts of floor plan, placement and routing of the physical design.	L2
PC104 (Advanced Computer Architecture) 511B	CO		
	PC104.1	Contrasting parallelism and pipelining concepts, the design aspects and challenges.	[L4]
	PC104.2	Evaluate the issues in vector and array processors.	[L5]
	PC104.3	Study and analyze the high performance scalable multi threaded and multiprocessor systems.	[L5]
	PC104.4	Learn about parallel algorithms for multiprocessors.	[L6]
	PC104.5	Know the memory contention and different arbitration techniques.	[L4]
	PC104.6	Illustrate various synchronization techniques for parallel programming interface	[L2]

	CO		
PC105 System on Chip Architecture)511B10	PC105.1	Acquire the knowledge of all the components required for System design.	L1
	PC105.2	Evaluate the performance of a system on chip by minimizing the delays.	L6
	PC105.3	Develop the analytical skill for deciding the type of processor required to design a SoC for the required application.	L5
	PC105.4	Classify the types and applications of different memory devices.	L2
	PC105.5	Analyse different types of interconnect buses required for different applications.	L4
	PC105.6	Understand a configurable device based on the application requirement for a system on chip.	L2
	CO		
PC106 vanced Digital Signal Processing)511B11	PC106.1	Design and Analyse the digital filters.	L6
	PC106.2	Obtain the complete knowledge of Structure in digital filters.	L3
	PC106.3	Comprehend the Finite word length effects in DSP Systems.	L4
	PC106.4	Acquire the basics of Multi rate digital signal processing and applications.	L2
	PC106.5	Interpret the concepts Linear prediction	L2
	PC106.6	Analyse the different Power Spectrum Estimation methods.	L5
	CO		
PC107 etection and Estimation Theory)511B1	PC107.1	Comprehend with the mathematical background of Signal Detection and Estimation.	L2
	PC107.2	Acquire basics of statistical decision theory used for Signal Detection and Estimation.	L2
	PC107.3	Examine the detection of deterministic and random signals using statistical models.	L4
	PC107.4	Test the performance of signal parameters using optimal estimators.	L6
	PC107.5	Analyze signal estimation in discrete-time domain using filters.	L4
	PC107.6	Choose the appropriate detection and estimation methods to solve the real time problems.	L3
	CO		
PC108 oding Theory and Techniques)511B1	PC108.1	Relate the capabilities, Probability of Error Detection and Correction using various methods	L1
	PC108.2	Estimate the apriori Probabilities for better Error Detection and Correction.	L1
	PC108.3	Develop the Optimal paths of Detecting and Correcting Errors.	L3
	PC108.4	Use Majority Logic Decoding in different Error Correcting Codes.	L3
	PC108.5	Implement Iterative techniques to simplify Error Detection and Correlation.	L6
	PC108.6	Apply these Error Correcting Codes in various practical applications.	L3
	CO		
PC109 ced Digital System Design Lab LAB)5	PC109.1	Simulate all basic logic gates.	L1
	PC109.2	Simulate and synthesize various combinational logic circuits.	L2
	PC109.3	Simulate and synthesize various sequential logic circuits.	L3
	PC109.4	Analyze the static and dynamic characteristics of CMOS inverter.	L2
	PC109.5	Implement Full Adder using transmission gate, Pseudo NMOS technology.	L3
	PC109.6	Design and implement EX-OR gate using CMOS, Pseudo-NMOS, Dynamic and Domino logic styles.	L6
	CO		
PC110 (Wireless Mobile Communication Laboratory) 511B110	PC110.1	Understanding Cellular concepts, GSM and CDMA networks	L1
	PC110.2	Analyze outdoor propagation models.	L4
	PC110.3	Summarize GSM handset by experimentation and fault insertion techniques	L2
	PC110.4	Understating of 3G communication system by means of various AT commands usage in GSM	L1
	PC110.5	Understanding CDMA concept using DSSS kit	L1
	PC110.6	Correlate concepts of OFDM in MATLAB Simulink.	L4
	CO		
PC111 (Research Methodology and Intellectual Property)511B111	PC111.1	Describe research problem formulation.	L1
	PC111.2	Analyze research related information.	L4
	PC111.3	Follow research ethics.	L3
	PC111.4	Understand the new developments in Intellectual Property Right.	L2
	PC111.5	Develop patent grants.	L6
	PC111.6	Create new and better products, and in turn brings about, economic growth and social benefits.	L6
		PG 1 yr I sem	
	CO		
PC116 (Microcontrollers and Programmable Digital Signal Processors)512B116	PC116.1	Compare ARM processor core based SoC with several features/peripherals based on requirements of embedded applications.	L4
	PC116.2	Identify and characterize architecture of Programmable DSP Processors.	L2
	PC116.3	Visualize the role of Real time Operating Systems in Embedded Systems.	L3
	PC116.4	Instantiate with Exceptions, Interrupts and Timers operations performed inside of the processors.	L3
	PC116.5	Design and practice small applications by utilizing the ARM processor core.	L6
	PC116.6	Develop small applications by utilizing the DSP processor based platform.	L6
	CO		
PC117 (Advanced Communication Networks)512B117	PC117.1	Understand the concepts of TCP/IP and Network Parameters.	L2
	PC117.2	Illustrate Internet Protocol concepts.	L2
	PC117.3	Explain the concepts of UDP and SCTP.	L2
	PC117.4	Familiarize to the architectures of ATM and SONET.	L2
	PC117.5	Measure the Quality of Service in Internet & Ad Hoc Wireless Networks.	L3
	PC117.6	Examine the Integrated Services Model, Resource reservation in Internet.	L4
	CO		
PC118 (Embedded System Design)512B118	PC118.1	Understand the basic characteristics of general computing systems and embedded systems.	L2
	PC118.2	Explain the Core of the Embedded System with peripherals.	L5
	PC118.3	Distinguish between memories, general purpose processors and domain specific purpose Processors.	L4
	PC118.4	Design of Embedded System for any type of applications.	L6
	PC118.5	Interpret concepts of Embedded Network Protocols	L5
	PC118.6	Build the framework of Wireless sensor networks and their design requirements	L6
	CO		
	PC119.1	Identify various sources of power dissipation in digital IC systems	L2

PC119 (Low Power VLSI Design)512B119	PC119.2	Realise the impact of power on system performance and reliability.	L3
	PC119.3	Acquire Knowledge about different Low power estimation Techniques.	L4
	PC119.4	Familiarize on various leakage sources and reduction techniques.	L2
	PC119.5	Estimate power dissipation in clock distribution	L4
	PC119.6	Design and develop low power Memory and Microprocessor systems	L6
	PC120 (Design of Fault Tolerant Systems)512B120	CO	
PC120.1		Explain the concepts of faults and fault tolerant systems.	L2
PC120.2		Demonstrate different approaches to build Fault Tolerant and Self Checking Circuits	L6
PC120.3		Recognize the need for fault models, controllability and observability in generation of test vectors for testing digital systems	L1
PC120.4		Design different architectures for Chip Level DFT Techniques.	L6
PC120.5		Illustrate different architectures for System Level DFT Techniques.	L6
PC121 (Digital Image and video Processing)512B121	CO		
	PC121.1	Analyze various advanced Image transforms.	L2
	PC121.2	Understand different techniques employed for the Enhancement of images both in Spatial & Frequency domain.	L2
	PC121.3	Explore image degradation and various restoration techniques.	L5
	PC121.4	Study the concepts of Colour Image Processing.	L4
	PC121.5	Demonstrate the basic concepts in Video Processing.	L4
PC122 (Machine Learning)512B122	CO		
	PC122.1	Student should be able to identify machine learning problems corresponding to different applications .	L2
	PC122.2	Ability to recognize the basic theory underlying machine learning.	L2
	PC122.3	Ability to identify machine learning techniques appropriate to respective problems	L5
	PC122.4	To compare range of machine learning algorithms along with their strengths and weaknesses.	L4
	PC122.5	To recognize the underlying mathematics and logic behind various machine learning algorithms under supervised and unsupervised paradigms	L4
PC123 (WIRELESS SENSOR NETWORKS)512B123	CO		
	PC123.1	To analyze various sensor nodes, sensor network programming.	L4
	PC123.2	To get acquaintance with medium access control protocols and addresses physical layer issues.	L2
	PC123.3	To inculcate key routing and transport layer protocols for sensor networks and main design issues.	L6
	PC123.4	To provide analysis of the power management aspects, time synchronization, localization and security issues.	L4
	PC124 (Microcontrollers and Programmable Digital Signal Processors Lab)512B124	CO	
PC124.1		Infer the instruction set of Cortex - M3.	L2
PC124.2		Interpret the instruction set of TI C6713 DSP Processor.	L3
PC124.3		Build and configure tool sets for developing applications based on ARM processor core and DSP processor.	L3
PC124.4		Develop prototype codes using commonly available on and off chip peripherals on the Cortex M3.	L6
PC124.5		Develop prototype codes using commonly available on and off chip peripherals on the DSP development boards.	L6
PC125 (Advanced Communication Networks Laboratory)512B125	CO		
	PC125.1	Identify the different types of network devices and their functions within a network.	L1
	PC125.2	Interpret and build the skills of sub-netting and routing mechanisms.	L2
	PC125.3	Summarize of Networking Commands (Ping, Tracert, TELNET, nslookup, netstat, ARP, RARP) and Network Configuration Files	L1
	PC125.4	Understand TCP and UDP protocols of computer networks	L2
	PC125.5	Devise a DHCP Server to serve contiguous IP addresses to a pool of four IP devices with a default gateway and a default DNS address.	L4
PC126 (Mini Project)512B126	CO		
	PC126.1	Understand the process of conducting research in Digital electronics and Communication Engineering.	L2
	PC126.2	Ability to work individually in solving research problems.	L3
	PC126.3	Ability to handle research based on the suitable methodology and observation method.	L3
	PC126.4	Ability to analyze and discuss critically research outcomes and, also the capability to obtain information for the development of the research.	L4
	PC126.5	Ability to present the research outcome scientifically through thesis/dissertation writing to document the findings of research;	L5
PC131 (MIMO)513B131	CO		
	C131.1	Perform mathematical modeling of MIMO systems.	L3
	C131.2	Analyze the performance of different diversity techniques.	L4
	C131.3	Derive channel capacity of a MIMO system.	L5
	C131.4	Apply the Space-Time coding in MIMO system.	L3
	C131.5	Comprehend multi-user communication in MIMO.	L2
PC132 (Real Time Operating Systems)513B132	CO		
	PC132.1	Explain the concepts of UNIX operating systems.	L2
	PC132.2	Contrast Concepts of real time operating systems with GPOS.	L3
	PC132.3	Define Objects services and IO subsystems.	L3
	PC132.4	Instantiating with Exceptions, Interrupts and Timer operations built in RTOS.	L5
	PC132.5	Compare various Real Time OS	L4
PC133 (IoT)513B133	CO		
	PC133.1	Explain concepts of IoT and Web technology.	L2
	PC133.2	Familiarize to the architecture features of M2M to IoT.	L4
	PC133.3	Illustrate architecture of IoT.	L5

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PC133 (Internet of Things & Applications) 513B133	PC133.4	Classify various application areas of IoT.	L2
	PC133.5	Learn IoT model architecture	L4
	PC133.6	Examine Privacy and Security constraints of IoT based applications.	L3
PC139 (Energy from Waste)513B139	CO		
	PC139.1	Understand the methods of recycling of waste.	L2
	PC139.2	Compare the methods of waste disposal.	L3
	PC139.3	Identify different sources of energy from waste.	L3
	PC139.4	Analyze methods for management of waste.	L4
	PC139.5	Understand the global trade in hazardous waste	L2
	PC139.6	Utilize different sources of energy in an efficient and economical way for practical utilities	L5
PC141 (M.Tech Major Project Phase I (514B141)	CO		
	PC141.1	Understand the process of conducting research in Digital electronics and Communication Engineering.	L2
	PC141.2	Ability to work individually in solving research problems.	L3
	PC141.3	Ability to handle research based on the suitable methodology and observation method.	L3
	PC141.4	Ability to analyze and discuss critically research outcomes and, also the capability to obtain information for the development of the research.	L4
	PC141.5	Ability to present the research outcome scientifically through thesis/dissertation writing to document the findings of research;	L5
PC142 (M.Tech Major Project Phase II (514B142)	CO		
	PC142.1	Understand the process of conducting research in Digital electronics and Communication Engineering.	L2
	PC142.2	Ability to work individually in solving research problems.	L3
	PC142.3	Ability to handle research based on the suitable methodology and observation method.	L3
	PC142.4	Ability to analyze and discuss critically research outcomes and, also the capability to obtain information for the development of the research.	L4
	PC142.5	Ability to present the research outcome scientifically through thesis/dissertation writing to document the findings of research;	L5
	PC142.6	Ability to present scientific study outcome verbally.	L5
COURSE OUTCOMES FOR OPEN ELECTIVES FROM H&M DEPT			
BUSINESS ANALYTICS	CO1	1. Have a knowledge of data analytics.	L 1
	CO2	2. Think critically in making decisions based on data analytics.	L 4
	CO3	3. Identify the befitting descriptive tool required for the business problem	L 3
	CO4	Identify appropriate prescriptive modeling technique for decision making.	L 5
	CO5	5. Apply suitable predicative method that supports business decision making.	L 3
	CO6	6. Translate data into clear, actionable insights in the decision making process.	L 6
COST MANAGEMENT OF ENGINEERING PROJECTS	CO1	1. Perceive the cost associated in managing engineering projects	L 2
	CO2	2. Prepare budgets for engineering projects.	L 3
	CO3	3. Enumerate and effectively handle the inventory management in reducing the project management cost.	L 4
	CO4	4. Envelope the cost associated in price fixation of the projects.	L 6
	CO5	5. Orient the cost management decision-making using quantitative methodology in minimizing the cost associated with the projects.	L 5
	CO6	6. Furnish effective cost management practices for better handling of engineering projects	L 5
ENGLISH FOR RESEARCH PAPER WRITING	CO1	1. The student will be able to understand the nuances of research writing.	L 2
	CO2	2. The student will be able to write a research paper with required writing skills and be confident to share their writing with others.	L 3
	CO3	3. The student will be able to publish a paper using the requisite standard in a journal.	L 6
	CO4	4. The student will be able to review the research papers and articles in a scientific manner.	L 5
	CO5	5. The student will be able to work on citations and ably place them in her research paper.	L 3
	CO6	6. The student will be able to avoid plagiarism and be able to develop her own writing skills in presenting the research work.	L 2
PEDAGOGY STUDIES	CO1	1. The pedagogical practices followed by teachers in developing countries both in formal and informal classrooms.	L 2
	CO2	2. To examine the effectiveness of pedagogical practices.	L 4
	CO3	3. To understand the concept, characteristics and types of educational research and perspectives of research.	L 2
	CO4	4. The role of teacher education, school curriculum and guidance materials for effective pedagogy	L 2
	CO5		
	CO6		
PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	CO1	1. Develop their personality and achieve their highest goal of life.	L 6
	CO2	2. Lead the nation and mankind to peace and prosperity.	L 4
	CO3	3. Develop versatile personality.	L 6
	CO4		
	CO5		
	CO6		
SANSKRIT FOR TECHNICAL KNOWLEDGE	CO1	1. Gain knowledge in basic SANSKRIT language.	L 2
	CO2	2. Understand the ancient SANSKRIT literature about Science & Technology	L 2
	CO3	3. Develop logical and analytical skills.	L 6
	CO4		
	CO5		
	CO6		
STRESS MANAGEMENT BY YOGA	CO1	1. Enhance of Physical strength and flexibility.	L 5
	CO2	2. Learn to relax and focus.	L 3
	CO3	3. Relieve physical and mental tension	L 3
	CO4	Improve work performance/ efficiency	L 3
	CO5		
	CO6		
	CO1	1. Gain knowledge on self-development.	L 2
	CO2	2. Learn the importance of Human Values.	L 5
	CO3	3. Develop overall personality.	L 6
	CO4		

VALUE EDUCATION	CO5		
	CO6		
CONSTITUTION OF INDIA	CO1	1. Get the clarity and idea about function of Indian constitution.	L 2
	CO2	2. Understand the Rights of equality, the Right of freedom and the Right to constitutional remedies	L 2
	CO3	3. Grab the knowledge of union government & their powers and function.	L 4
	CO4	4. Understand state and central policies, fundamental duties	L 2
	CO5	5. Understand powers and functions of Municipalities, Panchayats and Co-operative Societies	L 2
	CO6	6. Understand Electoral Process, special provisions	L 2
COURSE OUTCOMES FOR OPEN ELECTIVES FROM H&M DEPT			
Disaster Management (OE-1) OE115KH	CO -1	Learn different disasters and measures to reduce the risk due to these disasters.	L1
	CO -2	Learn institutional frame work for disaster management at national as well as global level.	L1
	CO -3	Develop the capacity to integrate knowledge and to analyze, evaluate and manage the different public health aspects of disaster events at a local and global levels, even when limited information is available.	L6
	CO -4	Demonstrate, describe, analyze and evaluate the environmental, social, cultural, economic, legal and organizational aspects influencing vulnerabilities and capacities to face disasters.	L5
	CO -5	Understand the emergency/disaster management cycle for various types of disasters.	L2
	CO -6	Develop a basic understanding of prevention, mitigation, preparedness, response and recovery on various types of disasters	L6
COMPOSITE MATERIALS	CO -1	Students will learn different composite materials and their applications	L3
	CO -2	Students will have capacity to integrate knowledge and to analyse, evaluate and manage the different types of reinforcements.	L4
	CO -3	Develop different types of metal/ceramic/polymer matrix composites and prepare the same for their specific needs as engineers.	L6
	CO -4	Critically enhance strength of the composite materials through Lamina usage.	L3
OPERATIONS RESEARCH	CO1	Apply linear programming models to several Engineering Applications.	L 3
	CO2	Able to apply the concept of non linear programming.	L 3
	CO3	In Dynamic Programming selected models were taught.	L 2
	CO4	Apply simple mathematical models in Inventory into the real Engineering Applications.	L 3
	CO5	Solve Game theory problems related to business applications	L 3
	CO6	To minimize waiting time of the customer and optimization of number of servers.	L 3
INDUSTRIAL SAFETY	CO1	Know the need for safety in industries	L 2
	CO2	Know about factory acts and industrial safety regulations	L 5
	CO3	Analyze causes and types of different hazards on their preventions	L 4
	CO4	Assess quality maintenance processes and maintenance work quality	L 5
	CO5	Assess safety practices and programs.	L 5
	CO6	Know about periodic and preventive maintenance activities in industries	L 5
POWER FROM RENEWABLE ENERGY SOURCES (OE -1)	C210.1	Analyse solar thermal and photovoltaic systems and related technologies for energy conversion	L4
	C210.2	Understand Wind energy conversion and devices available for it	L2
	C210.3	Understand Biomass conversion technologies, Geo thermal resources and energy conversion principles and technologies	L3
	C210.4	Realize Power from oceans (thermal, wave, tidal) and conversion devices	L3
	C210.5	Understand fundamentals of fuel cells and commercial batteries	L2
	C210.6	Suggest suitable method of power generation for a particular region/ organization based on the availability of resources.	L4