G.Narayanamma Institute of Technology and Science (For Women)
Autonomous
Shaikpet, Hyderabad.
Teaching & Learning Evaluation Committee
COURSE OUTCOMES - BLOOM'S TAXONOMY LEVELS FOR ALL THE COUSES OF GNR-18 REGULATIONS
DEPARTMENT OF ETE

B.Tech I Year-I Semester

COURSE NAME	CO number with code	CO STATEMENT	BT LEVEL
Physics (BS111AC)	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
	C101.6	Understand the underlying principles of optical fibers and fiber optics.	L1

Course Name	CO number with code	CO statement	BT level
Linear Algebra and Multivariable calculus (BS111AB)	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
	C102.6	Apply Laplace transform techniques to analyze continuous-time signals and systems.	L3

Course Name	CO number with code	CO statement	BT level
Programming for problem solving ES111AF	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
	C103.6	Understand the concepts of files and perform operations on them	L2

Course Name	CO number with code	CO statement	BT level
Engineering GraphicsES111AE	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
	C104.6	Ability to read, understand and interpret Engineering Drawings.	L2

Course Name	CO number with code	CO statement	BT level
Engineering Workshop ES11104	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
	C105.6	Design different prototype in the fittings , carpentry , foundry , black smithy and sheet metal work.	L6

Course Name	CO number with code	CO statement	BT level
Physics Lab BS11102	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
	C106.6	Engage themselves in team work and understand each other's strengths.	L2

Course Name	CO number with code	CO statement	BT level
Programming Lab ES11105	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
	C107.6	Solve problems using file concepts	L3

I Year -II Semester

Course Name	CO number with code	CO statement	BT level
Chemistry BS112AA	C108.1	Analyze microscopic chemistry in terms of atomic and molecular orbitals.	L5
	C108.2	Students will gain the basic knowledge of electrochemical procedures related to corrosion and its control.	L3
	C108.3	Rationalize periodic properties such as ionization potential, electronegativity and oxidation states.	L2
	C108.4	Students can develop and apply the concepts to identify the hardness and boiler troubles of water.	L2
	C108.5	List major chemical reactions that are used in the synthesis of drugs.	L1
	C108.6	Students can develop and apply the concepts for the solutions of complex engineering problems.	L3

Course Name	CO number with code	CO statement	BT level
Numerical Techniques and Transform Calculus BS112AG	C109.1	Find the root of the equation and solution of a system of equations.	L 1
	C109.2	Fit a curve for the given data.	L 2
	C109.3	Find the Numerical solutions for a given first order initial value problem.	L 3
	C109.4	Use Laplace Transform techniques for solving ODE's.	L 3
	C109.5	Verify the irrotational and solenoidal fields and find the potential function.	L 4
	C109.6	Evaluate the line, surface and volume integrals and converting them from one to another.	L 5

Course Name	CO number with code	CO statement	BT level
English HS112AJ	C110.1	Read complex texts actively comprehending the literal and figurative use of language and be able to read in-between the lines.	L 2
	C110.2	Write grammatically correct sentences and coherently well- developed paragraphs.	L 3
	C110.3	Apply the reading techniques and comprehend the passages critically.	L 3
	C110.4	Use appropriate vocabulary in the given context.	L 3
	C110.5	Appreciate how different genres use language and shape meanings.	L 5
	C110.6	Articulate clear questions, to provoke critical thinking, and ideas in class discussion to speak confidently in public.	L 4

Course Name	CO number with code	CO statement	BT level
Basic Electrical Engineering ES112AD	C111.1	Analyze the basic circuits with application of Network Reduction Techniques and Network Theorems	L3
	C111.2	Understand and analyze magnetic circuits.	L2
	C111.3	Analyze the working principles of electrical machines and power converters	L3
	C111.4	Understand the components of low voltage electrical installations.	L3
	C111.5	Apply the above conceptual theories to real world Electrical & Electronic problems and applications.	L4
	C111.6	Understand and apply the Knowledge of various types of protective systems in real time.	L3

Course Name	CO number with code	CO statement	BT level
Chemistry Lab BS11207	C112.1	The student is expected to learn from this laboratory course the concept of error and its analysis.	L2
	C112.2	Students can demonstrate writing skills and can derive valid conclusions.	L5
	C112.3	Students can compare the experimental results with those introduced in Lecture, draw relevant conclusions and substantiate	L3
	C112.4	Students can learn the ability to prepare advanced drug.	L4
	C112.5	Work on time reactions, thereby get in-depth knowledge on chemical kinetics.	L2
	C112.6	The course allows the students to develop and design new experimental	L6

Course Name	CO number with code	CO statement	BT level
English Professional and Communication Skills Lab HS11212	C113.1	Differentiate between the letters of alphabet and the phonetic symbols.	L2
	C113.2	Demonstrate the right pronunciation of the words in English using phonetic transcription and word stress.	L2
	C113.3	Speak with the proper intonation, voice modulation and tonal groups.	L6
	C113.4	Demonstrate the listening skills through language modules.	L2
	C113.5	Speak with clarity and confidence individually and in groups to discuss and present the topics chosen and understand the nuances of team dynamics.	L6
	C113.6	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

Course Name	CO number with code	CO statement	BT level
Basic Electrical Engineering Lab ES11209	C114.1	Identify & use basic measuring instruments and their usage.	L3
	C114.2	Verify different network theorems with dc excitation	L3
	C114.3	Carry out analysis of simple circuits with dc excitation	L2
	C114.4	Analyze bridge rectifiers	L3
	C114.5	Identify power converters.	L4
	C114.6	Identify different electrical machines & their characteristics.	L3

Course Name	CO number with code	CO statement	BT level
Computational Mathematics Lab ES11210	C115.1	Write Flow chart and algorithm for the given program.	L6
	C115.2	Have the ability to write C programs to solve specified problems.	L2
	C115.3	Find the root of a given equation using C program.	L3
	C115.4	Use arrays as part of the software solution.	L3
	C115.5	Utilize pointers to efficiently solve problems.	L3
	C115.6	Use functions from the portable C library.	L1

II Year-I Semester

Course Name	CO number with code	CO statement	BT level
Mathematical Analysis BS113AK	C201.1	Express an infinite series representation of periodic function in terms of the trigonometric sine and cosine functions	L 4
	C201.2	Solve first order partial differential equations.	L 3
	C201.3	Understand about analyticity of complex functions and its properties.	L 2
	C201.4	Integrate a complex valued function in a given region	L 3
	C201.5	Expand a complex function in a given region of convergence using Taylor's and Laurent's series	L 4
	C201.6	6. Applying knowledge of complex integrals for evaluation of real integrals.	L 3

Course Name	CO number with code	CO statement	BT level
Network Theory ES113AQ	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

Course Name	CO number with code	CO statement	BT level
Electronic Devices and Circuits PC113AW	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

Course Name	CO number with code	CO statement	BT level
Signals and Systems PC113AY	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

Course Name	CO number with code	CO statement	BT level
Digital System Design PC113AT	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

Course Name	CO number with code	CO statement	BT level
Electronic Circuits Lab PC11322	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

Course Name	CO number with code	CO statement	BT level
Basic Simulation Lab ES11314	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

Course Name	CO number with code	CO statement	BT level
Digital System Design Lab PC11320	C208.1	Develop the concepts in combinational and sequential circuits.	L2
	C208.2	Generate clock frequency and plot the transfer characteristics of inverter using NAND & NOR gates.	L2
	C208.3	Analyze the simple combinational circuits using different digital ICs.	L3
	C208.4	Design the higher order sequential circuits using lower order digital circuits.	L6
	C208.5	Verify the output of the digital circuits with respect to truth tables.	L3
	C208.6	Interpret and verify the digital circuits based on the fundamental properties.	L3

Course Name	CO number with code	CO statement	BT level
Gender Sensitization MC11317	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

Course Name	CO number with code	CO statement	BT level
Probability Theory & Stochastic Process BS114BA	C210.1	Comprehend the random variables, vectors and processes	L2
	C210.2	Analyze the use of multiple random variables and relate them to communication engineering problems	L4
	C210.3	Evaluate and apply moments & characteristic functions, inequalities and significance of Central Limit Theorem.	L5
	C210.4	Present the concept of Correlation, Power Density Spectrum and their properties.	L3
	C210.5	Explore relation between the output, input and Impulse Response of LTI system with respect to various statistical characteristics	L4
	C210.6	Create mathematical models for practical design problems and determine theoretical solutions to the created models.	L6

Course Name	CO number with code	CO statement	BT level
Material Science ES114BC	C211.1	Identify crystal structure for various materials	L1
	C211.2	Understand the mechanical properties of metals	L2
	C211.3	Classify the metals and their applications	L4
	C211.4	Assess the thermal and electrical properties of metals	L5
	C211.5	Classify the Nonmaterial and properties	L4
	C211.6	Analyze the economic, environmental and social issues in material science	L4

Course Name	CO number with code	CO statement	BT level
Analog Circuits PC114BF	C212.1	Classify various power amplifier circuits in terms of their functionality.	L4
	C212.2	Distinguish between Linear and Non-linear Wave shaping circuits.	L4
	C212.3	Analyze the operation of OP-AMP, Multivibrator and 555 Timer	L4
	C212.4	Design different types of Multivibrator circuits.	L6
	C212.5	Demonstrate various applications of op-amps.	L2
	C212.6	Illustrate the performance of ADC and DAC	L2

Course Name	CO number with code	CO statement	BT level
Analog and Digial Communications PC114BG	C213.1	Analyze different modulation and demodulation schemes for Analog & digital communications	L4
	C213.2	Evaluate fundamental communication system parameters such as bandwidth, power, signal to quantization noise ratio and figure of merit.	L5
	C213.3	Design Analog & Digital communication systems to meet desired needs.	L6
	C213.4	Elucidate the design tradeoffs and performance of Analog and Digital communication systems.	L2
	C213.5	Calculate error rate, spectral efficiency of baseband data transmission systems.	L3
	C213.6	Analyze the concept of source coding and channel coding techniques.	L4

Course Name	CO number with code	CO statement	BT level
Microprocessors and Microcontrollers PC114 BM	C214.1	Familiarise with internal architecture and organization of 8086 and 8051	L1
	C214.2	Write assembly language programs using 8086 and 8051	L3
	C214.3	Design and Develop microcontroller based system using 8051 interfacing	L6
	C214.4	Apply the knowledge of 8051 microcontroller in real time applications	L3
	C214.5	Relate the memory organization and memory interface with 8086/8051	L4
	C214.6	Discuss Various serial communication interface standards	L2

Course Name	CO number with code	CO statement	BT level
Analog Circuits Lab PC11426	C215.1	Illustrate the utility of various modes of 555 timers, applications of semiconductor devices and Op-Amps.	L2
	C215.2	Identify different types of DACs.	L1
	C215.3	Set up circuits to interpret the different applications of Op-Amps.	L2
	C215.4	Design, develop and test nonlinear wave shaping, Multivibrators, Amplifier circuits and estimate the relevant parameters.	L6
	C215.5	Compare the experimental results with theoretical results, explain the parameters involved and justify the results obtained.	L2
	C215.6	Interpret the results for further development of circuit features and subsequent applications Classify various power amplifier circuits in terms of their functionality.	L2

Course Name	CO number with code	CO statement	BT level
Analog and Digial Communications Lab PC11424	C216.1	Analyze the Analog Modulation schemes, circuit schematics and the parameters to be evaluated experimentally.	L4
	C216.2	Develop and implement MATLAB codes for various Analog Modulation schemes and estimate parameters from simulation results.	L6
	C216.3	Analyze and implement Digital Modulation schemes and verify the same by simulating in MATLAB.	L4
	C216.4	Comprehend the concept of Time Division Multiplexing and Pulse modulation schemes	L3
	C216.5	Demonstrate the Sampling and reconstruction of base band signals	L2
	C216.6	Analyze the spectrum of Analog/Digital Modulated signals	L4

Course Name	CO number with code	CO statement	BT level
Microprocessors and Microcontrollers Lab PC11432	C217.1	Familiarise with internal architecture and organization of 8086 and 8051	L1
	C217.2	Write assembly language programs using 8086 and 8051	L3
	C217.3	Design and Develop microcontroller based system using 8051 interfacing	L6
	C217.4	Apply the knowledge of 8051 microcontroller in real time applications	L3
	C217.5	Relate the memory organization and memory interface with 8086/8051	L4
	C217.6	Discuss Various serial communication interface standards	L2

Course Name	CO number with code	CO statement	BT level
Environmental Sciences MC114BE	C218.1	Benefited by various ecological principles and environmental regulations for sustainable development.	L2
	C218.2	Able to identify/analyze/evaluate/demonstrate the consequences of developmental activities and mitigation measures.	L5
	C218.3	Develop the advanced technologies in protection/conservation of resources in sustainable approach.	L6
	C218.4	Improved in attitude & thinking of the students will be positively towards earth & environment	L2
	C218.5	Benefited by knowing the concepts like Green Buildings, Low Carbon Lifestyle, International conventions etc.	L2
	C218.6	It helps the students to improve the quality of life.	L1

Course Name	CO number with code	CO statement	BT level
Linear Control Systems PC115CG	C301.1	Differentiate open-loop & closed-loop systems and discuss RH and Root locus techniques to determine the stability.	L2
	C301.2	Formulate mathematical modeling of continuous control systems using transfer function analysis.	L6
	C301.3	Analyze 1st and 2nd order systems with different inputs and design in time domain for a given specifications.	L4
	C301.4	Apply appropriate techniques such as Nyquist and Bode plot in frequency domain to determine and improve the stability of a system.	L3
	C301.5	Design different types of compensators for feedback control systems to improve system performance.	L6
	C301.6	Apply state space analysis to solve problems on continuous control systems.	L3

Course Name	CO number with code	CO statement	BT level
Digital Signal Processing PC115BY	C302.1	Apply ZT to analyse discrete signals and systems	L3
	C302.2	Analyze the spectral characteristics of discrete-time signals using DFT	L4
	C302.3	Design of different types of digital filters	L6
	C302.4	Distinguish between different Multi-rate Signal Processing techniques and identify finite word length effects.	L4
	C302.5	Illustrate the applications of DSP	L2

Course Name	CO number with code	CO statement	BT level
Electromagnetic Theory PC115CB	C303.1	Apply coordinate geometry, vector and vector calculus to find the electric field, magnetic field and combined field.	L3
	C303.2	Explain the electrostatic, magneto statics and time varying fields & laws which helps in formulating Maxwell's equation.	L4
	C303.3	To find the E & H at the boundary of different mediums	L4
	C303.4	Analyze EM wave propagation through different mediums and determine the losses due reflection and refraction EM waves through these medium	L4
	C303.5	To find the transmitted power at any radial distance using pointing vector	L4
	C303.6	Describe the fundamental working of transmission line and obtain its parameters using transmission line equation	L5

Course Name	CO number with code	CO statement	BT level
Professional Elective – I Computer Organization PE115BS	C304.1	Recognize the basic building blocks and functional details of a CPU	L2
	C304.2	Discuss the features of a general-purpose computer	L2
	C304.3	Demonstrate the construction and operation of individual building blocks of a CPU	L2
	C304.4	Analyze the generation of control and timing signals for the CPU design	L4
	C304.5	Employ advanced architectural features for performance improvement of the CPU	L3
	C304.6	Understand the parallelism both in terms of single and multiple processors.	L2

Course Name	CO number with code	CO statement	BT level
Professional Elective – I Electronic Measurements and Instrumentation PE115CC	C305.1	Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement	L2
	C305.2	Evaluate and perform accurate measurements for any engineering system with clear idea of the potential errors.	L5
	C305.3	Understand the working principles of various transducers.	L2
	C305.4	Select an appropriate transducer for given application.	L3
	C305.5	Use instruments like spectrum analyzer, DSO and other virtual instrumentation techniques for appropriate measurements.	L3
	C305.6	Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.	L4

Course Name	CO number with code	CO statement	BT level
Professional Elective – I VLSI Design PE115CM	C306.1	Acquire qualitative knowledge on the fabrication process of integrated circuits using MOS transistors.	L1
	C306.2	Analyze modes of operation of MOS transistor and its basic electrical properties.	L4
	C306.3	Design different VLSI Data path subsystems.	L6
	C306.4	Illustrate semiconductor memory design using MOS transistors.	L4
	C306.5	Implementation of simple logic circuits using PLA, PAL, FPGA and CPLD.	L3
	C306.6	Illustrate how DFT principles can be applied for testing of manufactured ICs.	L4

Course Name	CO number with code	CO statement	BT level
FUNDAMENTALS OF DATA STRUCTURES OE115KA	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

Course Name	CO number with code	CO statement	BT level
JAVA PROGRAMMING OE115KB	C308.1	Understand the object oriented programming concepts and solve real world problems	L2
	C308.2	Demonstrate the use of inheritance and packages	L2
	C308.3	Understand and implement the concepts of exception handling	L2
	C308.4	Develop multithreaded applications with synchronization	L6
	C308.5	Solve problems using java collection framework and I/O classes	L3
	C308.6	Design Graphical User Interface using applets and swing controls.	L6

Course Name	CO number with code	CO statement	BT level
ELECTRICAL MATERIALS OE115KD	C309.1	Distinguish between magnetic and non-magnetic materials by acquiring the knowledge of their atomic structures	L2
	C309.2	Analyse Dielectric and semiconductor materials	L3
	C309.3	Analyse the magnetic materials using their properties	L3
	C309.4	Identify special purpose materials for different applications	L2
	C309.5	Analyse the working of different materials from the point of view of their applications in electrical industry.	L4
	C309.6	Analyse the working of special purpose materials from the point of view of their possible applications electrical & other fields.	L3

Course Name	CO number with code	CO statement	BT level
OPERATIONS RESEARCH KE	C310.1	Apply linear programming models to several Engineering Applications	L3
	C310.2	Use several other techniques like Transportation, Assignment and Sequencing Models in the real world applications	L3
	C310.3	Study selected Dynamic Programming models for real world situations	L4
	C310.4	Apply simple mathematical models in Inventory into the real Engineering Applications.	L3
	C310.5	Solve Game theory problems related to business applications.	L3
	C310.6	Develop optimum replacement policy	L6

Course Name	CO number with code	CO statement	BT level
INTRODUCTION TO DATA ANALYTICS OE115KF	C311.1	Understand the definitions and concepts associated with central tendency and measures of dispersion	L1
	C311.2	Find the probability of an event and know the properties of distribution	L4
	C311.3	Determine the regression co-efficient and test the accuracy of co-efficient	L3
	C311.4	Learn basic concepts in supervised learning	L5
	C311.5	Attain basic knowledge in unsupervised learning	L3
	C311.6	Understand past behavior of data and forecast the future behavior using time series analysis	L6

Course Name	CO number with code	CO statement	BT level
INTELLECTUAL PROPERTY RIGHTS OE115KG	C312.1	Understand the dynamics and legalistic framework of IPR's	L2
	C312.2	Acquaint with securing patents and its protection.	L5
	C312.3	Seize the dimensions of Copy right protection	L2
	C312.4	Realize the eminence of Trade Marks in growth of business	L3
	C312.5	Essentials of safeguarding Industrial designs	L1
	C312.6	Sustentation of Trade Secrets and aspects of IP audit	L4

Course Name	CO number with code	CO statement	BT level
DISASTER MANAGEMENT OE115KH	C313.1	Understand different kinds of disasters and their vulnerabilities	L2
	C313.2	Identify the causes, effects and mitigation measures of different disasters	L1
	C313.3	Apply the disaster management mechanism in natural and man induced calamities	L3
	C313.4	Analyse and solve the unforeseen situations with advanced technologies like Remote Sensing and Geological Information Systems	L5

Course Name	CO number with code	CO statement	BT level
Digital Signal Processing Lab PC11538	C314.1	Understand fundamental concepts & usage of simulation software in the field of Digital Signal Processing	L2
	C314.2	Identify the specifications, requirements & built in functions to perform mathematical operations involving discrete sequences.	L1
	C314.3	Develop code for designing various filters.	L6
	C314.4	Develop code for analyzing Fourier and Z transforms and their utility.	L6
	C314.5	Develop code for sampling rate conversion.	L6
	C314.6	Generate relevant simulation codes, with and without usage of built in functions & estimation of the numerical results with supporting plots.	L6

Course Name	CO number with code	CO statement	BT level
Electronic Communication Design Lab PC11541	C315.1	Demonstrate practical knowledge of how physical quantities are converted to and from electrical signals in sensors and actuators, respectively	L2
	C315.2	Design real-time applications using microcontroller boards and sensors.	L6
	C315.3	Acquaint with programming microcontroller boards using Embedded C	L3
	C315.4	Build the skills required to upload sensor data to the Internet.	L6
	C315.5	Analyse the working of various blocks of communication systems.	L4
	C315.6	Expertise on working with real-time signals using LabVIEW.	L1

Course Name	CO number with code	CO statement	BT level
Employability and Soft Skills Lab HS11542	C316.1	Apply basic communication skills (LSRW) in work-related situations.	L3
	C316.2	Acquire, organize, interpret and evaluate information for effective communications within a group.	L5
	C316.3	Demonstrate the ability to combine ideas or information in new ways and present information on guided and structured format.	L2
	C316.4	Make decisions and solve problems by specifying goals, identifying resources and constraints and evaluating results.	L5
	C316.5	Display personal qualities such as responsibility, self-management, self- confidence, ethical behaviour and respect for self and others.	L2
	C316.6	Work cooperatively with people of diverse backgrounds and abilities, identify group's goals and values and contribute to a group process with ideas, suggestions and efforts.	L1

III Year-II Semester

Course Name	CO number with code	CO statement	BT level
Managerial Economics and Financial Analysis HS116DE	C317.1	Cognize the Basic Concepts of Economics	L 2
	C317.2	Analyze the economic concepts for using discretion in business problem solving.	L 4
	C317.3	Comprehend the concepts of Accounting for business decision making	L 3
	C317.4	Assimilate the basic Accounting Procedure and interpret the statement	L 5
	C317.5	Analogize the external business environment for attainment of business goals.	L 4
	C317.6	Enable forecasting and analyzing the external business environment.	L 6

Course Name	CO number with code	CO statement	BT level
Principles of Computer Networks PC116DJ	C318.1	Independently understand basic computer network technology, different types of network topologies and protocols.	L2
	C318.2	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer.	L1
	C318.3	Identify the different types of network devices and their functions within a network.	L3
	C318.4	Understand and building the skills of subnetting and routing mechanisms.	L2
	C318.5	Acquaint with the knowledge of various routing protocols.	L2
	C318.6	Familiarity with various types of messages being exchanged at different layers of an Internet.	L1

Course Name	CO number with code	CO statement	BT level
Telecommunication Switching Systems and Networks PC116DL	C319.1	Acquire knowledge about Telecommunication Switching Systems, BISDN, ATM, VoLTE and IMS	L1
	C319.2	Understand different Telecommunication switching and signaling methodologies, BISDN, ATM, VoLTE and IMS	L2
	C319.3	Apply the concepts to solve the real time telecommunication problems	L3
	C319.4	Analyze the fundamental telecommunication traffic models	L4
	C319.5	Evaluate telecommunication switching systems	L5
	C319.6	Design a telecommunication switching network	L6

Course Name	CO number with code	CO statement	BT level
Professional Elective II 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

Course Name	CO number with code	CO statement	BT level
Professional Elective II Adaptive Signal Processing PE116CN	C321.6	Apply the basic probability theory to model random signals in terms of second order statics of Random Processes	L3
	C321.7	Evaluate the covariance matrices to describe the Wiener filter for signals with known second order statistics.	L4
	C321.8	Design and implement discrete time Wiener filter	L6
	C321.9	Determine suitable LMS step size to trade off convergence time and misadjustment	L3
	C321.10	Derive and apply the RLS algorithm for iteratively estimating the Wiener filter weights	L4
	C321.11	Design and implement the Kalman filter	L5

Course Name	CO number with code	CO statement	BT level
Professional Elective II Digital Image Processing PE116CV	C322.1	Understands the basics of 2D image and its processing	L2
	C322.2	Analyze the image using different transforms	L4
	C322.3	Learn different enhancement techniques in spatial and frequency domain	L3
	C322.4	Restore the degraded image and perform segmentation on image.	L3
	C322.5	Study the details of color image processing	L2
	C322.6	Compare different compression techniques used for image compression	L3

Course Name	CO number with code	CO statement	BT level
OPERATING SYSTEMS OE116KJ	C323.1	Acquire a High-level understanding of what is an operating system and the role it plays and the services it provides	L2
	C323.2	Understand process management concepts including scheduling, synchronization	L2
	C323.3	Describe System model for deadlock, Methods for handling deadlocks	L1
	C323.4	Understand of memory management including virtual memory	L2
	C323.5	Acquire Knowledge on issues related to file system interface and implementation	L2
	C323.6	Understand the issues related to disk management	L2

Course Name	CO number with code	CO statement	BT level
DATABASE MANAGEMENT SYSTEMS OE116KK	C324.1	Understand concepts and the applications of database systems and ability to implement in real time applications.	L2
	C324.2	Construct an Entity-Relationship (E-R) model from specifications and transform to relational model.	L6
	C324.3	Demonstrate the basic concepts of relational database management system and construct unary/binary/set/aggregate queries in Relational Algebra and in SQL	L2
	C324.4	Apply normalization on database.	L3
	C324.5	Understand principles of database transaction management	L2
	C324.6	Understand the storage and recovery of database	L2

Course Name	CO number with code	CO statement	BT level
RENEWABLE ENERGY SOURCES OE116KM	C325.1	Estimate the solar energy, Utilization of solar energy, Principles involved in solar energy collection and conversion of it to electricity generation	L2
	C325.2	Explore the concepts involved in wind energy conversion system by studying its components, types and performance	L4
	C325.3	Understand the concept of Biomass energy resources and their classification, types of biogas Plants- applications	L2
	C325.4	Acquire the knowledge on Geothermal energy and it's harnessing methods	L3
	C325.5	Illustrate ocean energy and explain the operational methods of their utilization	L4
	C325.6	Describe the concept of direct energy conversion and their types and working principle	L2

Course Name	CO number with code	CO statement	BT level
OPERATIONS RESEARCH KE	C326.1	Apply linear programming models to several Engineering Applications	L3
	C326.2	Use several other techniques like Transportation, Assignment and Sequencing Models in the real world applications	L3
	C326.3	Study selected Dynamic Programming models for real world situations	L4
	C326.4	Apply simple mathematical models in Inventory into the real Engineering Applications.	L3
	C326.5	Solve Game theory problems related to business applications.	L3
	C326.6	Develop optimum replacement policy	L6

Course Name	CO number with code	CO statement	BT level
RESEARCH METHODOLOGY OE116KN	C327.1	Develop an understanding on various kinds of research and objectives of doing research	L5
	C327.2	Perform literature reviews using print and online databases	L6
	C327.3	Design good research	L6
	C327.4	Collect required data for Research and to adopt methods for data collection	L6
	C327.5	Interpret the data from research perception	L6
	C327.6	Write and present a substantial technical report and document	L5

Course Name	CO number with code	CO statement	BT level
BEHAVIOURAL SKILLS AND PROFESSIONAL COMMUNICATION OE116KP	C328.1	Communicate with more confidence and self-esteem	L2
	C328.2	Give better presentation and explanation using digital aids and tools	L5
	C328.3	Perform effectively and efficiently in the work place environment	L3
	C328.4	Exhibit better tolerance and receptiveness in understanding and accepting diversity	L2
	C328.5	Apply higher thinking order in the self-development process	L3
	C328.6	Equip oneself to handle the work related challenges and conflicts professionally	L5

Course Name	CO number with code	CO statement	BT level
INTELLECTUAL PROPERTY RIGHTS OE116KG	C329.1	Understand the dynamics and legalistic framework of IPR's	L2
	C329.2	Acquaint with securing patents and its protection.	L5
	C329.3	Seize the dimensions of Copy right protection	L2
	C329.4	Realize the eminence of Trade Marks in growth of business	L3
	C329.5	Essentials of safeguarding Industrial designs	L1
	C329.6	Sustentation of Trade Secrets and aspects of IP audit	L4

Course Name	CO number with code	CO statement	BT level
Computer Networks Lab PC11644	C330.1	Understand working of different TCP/IP protocols.	L2
	C330.2	Simulate simple LAN, WAN network models with multiple scenarios, collect statistics on network performance.	L5
	C330.3	Apply mathematical foundation to understand the fundamental relationship between packet loss probability and TCP performance.	L3
	C330.4	Analyze the performance of different switching techniques, routing protocols.	L4
	C330.5	Compare different switching schemes.	L4
	C330.6	Acquaint with the concepts of LTE.	L3

Course Name	CO number with code	CO statement	BT level
Telecommunications Lab PC11653	C331.1	Analyze the routing and console programming in Digital Automatic Telephone Exchange and EPABX	L4
	C331.2	Analyze and simulate different ISDN layers, Network routing algorithms, congestion control in TCP	L4
	C331.3	Analyze Voice over Internet Protocol	L4
	C331.4	Analyze different topologies and protocols in LAN ,wireless local area networking and the hidden terminal problem in WLAN	L4
	C331.5	Evaluate the performance of Pure and Slotted ALOHA system	L5
	C331.6	Create subnets using TCP/IP Model and 802.3 Ethernet	L6

Course Name	CO number with code	CO statement	BT level
Seminar	C332.1	Research literature to identify the latest trends in engineering and choose state of art technology to deliver a seminar.	L4
	C332.2	Demonstrate effectively the ideas presented in engineering technologies to engineering community and with society at large.	L3
	C332.3	Summarize the ideas involved in different engineering technologies in a precise and succinct manner.	L2
	C332.4	Engage in meaningful discussion about state of art technologies for efficient knowledge transfer.	L3

Course Name	CO number with code	CO statement	BT level
Fundamentals of Management HS117EC	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
	C401.6	Understand articulating techniques of controlling in the process of an organization.	L6

Course Name	CO number with code	CO statement	BT level
Wireless communications PC117EU	C402.1	Design appropriate mobile cellular communication systems	L6
	C402.2	Apply frequency-reuse concept in mobile communications	L3
	C402.3	Analyze path loss, interference in wireless communication systems	L4
	C402.4	Comprehend the concepts on fading, diversity and equalisation	L2
	C402.5	Design wireless communication system over multipath fading environment	L6
	C402.6	Distinguish various multiple access techniques of mobile communications	L1

Course Name	CO number with code	CO statement	BT level
PROFESSIONAL ELECTIVE III Voice over Internet Protocol PE117ET	C403.1	Understand various concepts related to IPV4, IPV6 and RTP	L2
	C403.2	Illustrate various challenges in the implementation of VOIP and modifications required to meet these challenges	L2
	C403.3	Demonstrate knowledge about various protocols developed for the implementation of VOIP	L2
	C403.4	Analyze the message formats used in H.323 and SIP Protocols	L4
	C403.5	Handle the QOS requirements in VOIP and various protocols developed to ensure QOS	L4
	C403.6	Implement internetworking of VOIP with already existing networks	L3

Course Name	CO number with code	CO statement	BT level
PROFESSIONAL ELECTIVE III Fiber Optic Communications PE117EA	C404.1	Demonstrate an understanding of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.	L2
	C404.2	Estimate the signal degradations and of an optical signal in different types of fibers	L5
	C404.3	Analyze various types of optical sources and swiches and their functionalities	L4
	C404.4	Compare the characteristics of optical detectors	L2
	C404.5	To assess the different techniques to improve the capacity of the system	L5
	C404.6	Analyse the non linear effects of fiber optic links	L4

Course Name	CO number with code	CO statement	BT level
PROFESSIONAL ELECTIVE III	C405.1	To analyze completely the rectangular waveguides and their mode characteristics and apply them for solving practical microwave transmission line problems.	L4

Microwave Engineering PE117EJ			
	C405.2	To distinguish between the different types of waveguide and ferrite components, explain their functioning and select proper components for engineering applications.	L4
	C405.3	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
	C405.4	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
	C405.5	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
	C405.6	To set up a microwave bench, establish the measurement procedure and conduct the experiments in microwave lab for measurement of various microwave parameters identifying the possible errors.	L4

Course Name	CO number with code	CO statement	BT level
PROFESSIONAL ELECTIVE IV Fundamentals of IoT PE117EB	C406.1	Understand the concepts of IoT.	L2
	C406.2	Differentiate IoT and M2M	L4
	C406.3	Identify the problems in various domains and propose solutions for the same	L5
	C406.4	Effectively apply the knowledge of programming python	L3
	C406.5	Design IoT applications in different domain and be able to analyze their performance	L6
	C406.6	Implement basic IoT applications on embedded platform	L6

Course Name	CO number with code	CO statement	BT level
PROFESSIONAL ELECTIVE IV Global Navigation Satellite Systems PE117EE	C407.1	Explain the operation of basic satellite communication.	L2
	C407.2	Differentiate between various GNSS constellations and describe the three GNSS segments and explain the signal structure of GNSS.	L2
	C407.3	Frame various coordinate systems for estimating position.	L2
	C407.4	Estimate the various errors and their effect on position estimation.	L2
	C407.5	Determine user position from Navigation and Observation data formats.	L6
	C407.6	Apply DGPS principle and can also analyze various augmentation systems.	L4

Course Name	CO number with code	CO statement	BT level
PROFESSIONAL ELECTIVE IV Embedded Systems Design PE117DX	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
	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

Course Name	CO number with code	CO statement	BT level
CYBER SECURITY 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

Course Name	CO number with code	CO statement	BT level
PYTHON PROGRAMMING 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

Course Name	CO number with code	CO statement	BT level
ANDROID PROGRAMMING 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

Course Name	CO number with code	CO statement	BT level
WASTE MANAGEMENT TECHNIQUES AND POWER GENERATION OE117KV	C412.1	Understand technologies for generation of energy from solid waste	L1
	C412.2	Compare methods of solid waste disposal.	L2
	C412.3	Identify sources of energy from waste using various conversion techniques	L2
	C412.4	Analyze methods for waste management	L3
	C412.5	Assess the harmful effects of e-waste	L4
	C412.6	Differentiate between the normal waste and e-waste	L2

Course Name	CO number with code	CO statement	BT level
INDUSTRIAL MANAGEMENT OE117KW	C413.1	Organize the activities of Business efficiently	L3
	C413.2	Adapt to appropriate method of production yielding productivity	L6
	C413.3	Identify efficient method of production	L3
	C413.4	Handle inventory efficiently for improving Productivity	L3
	C413.5	Implement and maintain Quality standards in Production.	L5
	C413.6	Cohere to dynamic practices to improve Productivity	L4

Course Name	CO number with code	CO statement	BT level
Wireless communications Lab PC11762	C414.1	Comprehend Cellular concepts of GSM and CDMA networks	L2
	C414.2	Calculate path loss for Free space, Okumura and Hata models for outdoor propagation.	L3
	C414.3	Analyze the impact of multi path effects in the design of wireless system.	L4
	C414.4	Implement RAKE receiver for CDMA communication system	L6
	C414.5	Analyze 4G mobile system architecture	L4
	C414.6	Apply Differential Coding concepts in implementation of communication system.	L3

Course Name	CO number with code	CO statement	BT level
Mini Project PW11758	C415.1	Research literature to identify existing solutions to practical engineering problems and gain insight into new and better ways of solving it.	L4
	C415.2	Demonstrate effectively the solutions to complex engineering problems to the engineering community and with society at large.	L3
	C415.3	Implement solutions for complex engineering problems and design system components or processes that meet the specified requirements.	L6
	C415.4	Document the complete design cycle in a precise and succinct manner.	L5
	C415.5	Work as a part of diverse team to deliver best quality deliverables.	L3

Course Name	CO number with code	CO statement	BT level
Project Phase-I PW11761	C416.1	Research literature to identify existing solutions to practical engineering problems and gain insight into new and better ways of solving it.	L4
	C416.2	Demonstrate effectively the solutions to complex engineering problems to the engineering community and with society at large.	L3
	C416.3	Implement solutions for complex engineering problems and design system components or processes that meet the specified requirements.	L6
	C416.4	Document the complete design cycle in a precise and succinct manner.	L5
	C416.5	Work as a part of diverse team to deliver best quality deliverables.	L3

IV Year-II Semester

Course Name	CO number with code	CO statement	BT level
Entrepreneurship and Project Management HS118FK	C417.1	Possess sensibleness and skills required for establishment of business.	L 3
	C417.2	Construe the entrepreneurial ingenuity required for business functioning.	L 5
	C417.3	Give perception on the probable business structures for entrepreneurial decisions	L 4
	C417.4	Scrutinize the probable financial propositions in investment process.	L 5
	C417.5	Evaluate the entrepreneurial project feasibility of implementation and its profitability.	L 5
	C417.6	Delve the market for the product developed through entrepreneurial establishment	L 6

Course Name	CO number with code	CO statement	BT level
Professional Elective -V 4G Technologies PE118EW	C418.1	Explain and compare Second and Third Generation technologies, their architectures	L2
	C418.2	Describe improved version of 2G technology i.e., evolution Generation (2.5G)	L2
	C418.3	Evaluate the performance of OFDM system in fading environment	L5
	C418.4	Differentiate various hybrid multiple access schemes used in 4G systems	L4
	C418.5	Demonstrate the knowledge about UWB modulation schemes	L2
	C418.6	Describe LTE Architecture and physical layer procedures	L2

Course Name	CO number with code	CO statement	BT level
Professional Elective -V Adhoc Wireless Networks PE118EZ	C419.1	Demonstrate knowledge on various concepts related to WLANs and adhoc wireless networks	L1
	C419.2	Understand the designing issues of MAC, Routing and Transport protocols of Adhoc Networks	L2
	C419.3	Apply different MAC, Routing and Transport protocols, security issues and Energy management schemes for real time scenarios	L5
	C419.4	Analyze various MAC, Routing and Transport protocols, security issues and Energy management schemes	L6
	C419.5	Evaluate the performance of adhoc wireless network protocols in all the layers	L4
	C419.6	Design protocols for adhoc wireless networks for better performance	L4

Course Name	CO number with code	CO statement	BT level
Professional Elective -V Information Theory and Coding PE118FR	C420.1	Understand the applicability of Information concepts and various methods of error detection and correction.	L2
	C420.2	Define the performance of different channel capacities, bounds.	L1
	C420.3	Understand the capabilities of block codes and cyclic codes in terms of optimal encoding and decoding.	L2
	C420.4	Analyze the performance of various data compression techniques.	L4
	C420.5	Design codes for error detection and correction of sequential data with low error probability.	L6
	C420.6	Compare error handling capabilities and circuit complexities.	L4

Course Name	CO number with code	CO statement	BT level
Professional Elective -VI Radar Sytems PE118FW	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
	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

Course Name	CO number with code	CO statement	BT level
Professional Elective -VI Software Defined Radio and Cognitive Radio PE118FY	C422.1	Gain the fundamental concepts of Software defined radio	L2
	C422.2	Analyze the hardware and software architecture of Software defied radio	L4
	C422.3	Identify the limitations of ADCs and DACs	L2
	C422.4	Comprehend the concepts of Cognitive Radio	L2
	C422.5	Develop the Cognitive radio, as well as techniques for spectrum sensing	L6
	C422.6	Investigate various ranging and localization techniques for better spectrum exploitation	L4

Course Name	CO number with code	CO statement	BT level
Professional Elective -VI Network Security PE118FU	C423.1	Identify some of the factors driving the need for network security	L1
	C423.2	Analyze the vulnerabilities in any computing system and hence be able to design a security solution	L4
	C423.3	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems	L2
	C423.4	Effectively apply relevant standards, ethical considerations, and an understanding of privacy issues to designing secure networks	L3
	C423.5	Understand the standard security services and mechanisms used to provide confidentiality, integrity and authenticity	L2
	C423.6	Apply the knowledge and abide by the legal framework that governs computer and information systems	L3

Course Name	CO number with code	CO statement	BT level
PRINCIPLES OF ARTIFICIAL INTELLIGENCE OE118KX	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
	C424.6	Ability to recognize basics of Natural Language Processing.	L5

Course Name	CO number with code	CO statement	BT level
CLOUD COMPUTING OE118KY	C425.1	Articulate the main concepts, key technologies, strengths, and limitations of cloud computing.	L2
	C425.2	Illustrate the broad perceptive of cloud architecture and model	L2
	C425.3	Apply and design suitable Virtualization concept.	L3
	C425.4	Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications	L4
	C425.5	Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application	L5
	C425.6	Analyse the various standards for Cloud computing and its management	L4

Course Name	CO number with code	CO statement	BT level
ROBOTICS OE118MA	C426.1	Identify a Robot for a specific application	L2
	C426.2	Identify parameters required to be controlled in a Robot	L2
	C426.3	To select suitable sensors and drive system for an application	L3
	C426.4	To learn various robot programming methods and languages	L3
	C426.5	To learn various industrial robot control systems and Mission Vision system	L3
	C426.6	To understand Socio-Economic aspect of robotisation	L3

Course Name	CO number with code	CO statement	BT level
MARKETING MANAGEMENT OE118MB	C427.1	Understand the importance of the Marketing Management Process	L2
	C427.2	Conduct Marketing Research, comprehend buyer behavior and hypothesize market segmentation	L4
	C427.3	Identify the elements of product mix and pricing strategies.	L3
	C427.4	Enumerate strategies of pricing in fixation	L5
	C427.5	Select appropriate network of product distribution	L3
	C427.6	Adapt to befitting promotional strategy.	L6

Course Name	CO number with code	CO statement	BT level
ENVIRONMENTAL IMPACT ASSESSMENT OE118MC	C428.1	Understand the basic concepts of Environmental Impact Assessment, Environmental Impact Statement and Environmental Audit	L2
	C428.2	Identify the environmental aspects to be considered for the Environmental Impact Assessment study	L1
	C428.3	Apply the knowledge of Environmental Impact Assessment studies in Preparation of Environmental Impact Statement	L3
	C428.4	Prepare suitable methodology in Environmental Impact Assessment documentation	L6
	C428.5	Analyse and evaluate the mitigation measures of developmental activities on environmental components	L5

Course Name	CO number with code	CO statement	BT level
Project Phase II	C429.1	Research literature to identify existing solutions to practical engineering problems and gain insight into new and better ways of solving it.	L4
	C429.2	Demonstrate effectively the solutions to complex engineering problems to the engineering community and with society at large.	L3
	C429.3	Implement solutions for complex engineering problems and design system components or processes that meet the specified requirements.	L6
	C429.4	Document the complete design cycle in a precise and succinct manner.	L5
	C429.5	Work as a part of diverse team to deliver best quality deliverables.	L3

G.Narayanamma Institiute of Technology and Science (For Women)
Autonomous
Shaikpet, Hyderabad.
Teaching & Learning Evaluation Committee
COURSE OUTCOMES- BLOOM'S TAXONOMY LEVELS FOR ALL THE COURSES OF
GNR-18 REGULATIONS
DEPARTMENT OF ETE

M.TECH I Year I Semester			

Course Name	CO number with code	CO statement	BT level
	C101.1	Design appropriate mobile communication systems	L6
	C101.2	Apply frequency-reuse concept in mobile communications	L3
	C101.3	Distinguish various multiple-access techniques of mobile communications	L2
Wireless and Mobile Communications PC 1	C101.4	Analyze path loss, interference for wireless telephony in mobile communication system	L4
	C101.5	Analyze CDMA system concepts	L4
	C101.6	Comprehend the concepts on fading, diversity and equalization	L2

Course Name	CO number with code	CO statement	BT level
	C102.1	Demonstrate knowledge on various concepts related to WLANs	L2
	C102.2	Acquaintance of knowledge regarding PANs	L1
	C102.3	Understand the designing issues of MAC, Routing and Transport protocols of Adhoc Networks	L2
Adhoc Wireless Networks PC 2	C102.4	Analyze various MAC, Routing and Transport protocols and their performance evaluation	L4
	C102.5	Familiarity with the security issues in Adhoc networks	L2
	C102.6	Understand regarding Quality of Service in Adhoc networks	L2

Course Name	CO number with code	CO statement	BT level
	C103.1	Independently understand basic computer network technology, different types of network topologies and protocols	L2
	C103.2	Enumerate the layers of the OSI model and TCP/IP. Explain the function(s) of each layer	L1
Internetworking with TCP/IP PSE 1	C103.3	Identify the different types of network devices and their functions within a network	L4
	C103.4	Understand and building the skills of subnetting and routing mechanisms	L6
	C103.5	Acquaint with the knowledge of various routing protocols	L3
	C103.6	Acquaint with the knowledge of various routing protocols	L1

Course Name	CO number with code	CO statement	BT level
Detection & Estimation Theory PSE 1	C104.1	Comprehend with the mathematical background of Signal Detection and Estimation	L2
	C104.2	Acquire basics of statistical decision theory used for Signal Detection and Estimation	L2
	C104.3	Examine the detection of deterministic and random signals using statistical models	L4
	C104.4	Test the performance of signal parameters using optimal estimators	L6
	C104.5	Analyze signal estimation in discrete-time domain using filters	L4
	C104.6	Choose the appropriate detection and estimation methods to solve the real time problems	L3

Course Name	CO number with code	CO statement	BT level
Antenna Theory & Design PSE 1	C105.1	Learn the various parameters of antenna and same is used for further analysis of antennas	L1
	C105.2	Compute the far field distance, radiation pattern and gain of an antenna for given current distribution	L3
	C105.3	Determination of the input impedance & efficiency for different antennas	L4
	C105.4	Compute the array factor for an array of identical antennas	L3
	C105.5	Design antennas and antenna arrays for various desired radiation pattern characteristics	L6
	C105.6	Design antennas for particular applications	L6

Course Name	CO number with code	CO statement	BT level
Coding Theory and Techniques PSE 2	C106.1	Relate the capabilities, Probability of Error Detection and Correction using various methods	L1
	C106.2	Estimate the apriori Probabilities for better Error Detection and Correction	L1
	C106.3	Develop the Optimal paths of Detecting and Correcting Errors	L3
	C106.4	Use Majority Logic Decoding in different Error Correcting Codes	L3
	C106.5	Implement Iterative techniques to simplify Error Detection and Correlation	L6
	C106.6	Apply these Error Correcting Codes in various practical applications	L3

Course Name	CO number with code	CO statement	BT level
Mobile Computing PSE 2	C107.1	Articulate the basics of mobile computing and its standards	L1
	C107.2	Describe Cellular Network architectures, operations of GSM, GPRS etc.	L2
	C107.3	Demonstrate the knowledge of various platforms like Palm OS, Symbian OS and Windows CE used for mobile devices	L2
	C107.4	Develop mobile applications using JAVA 2 micro edition (J2ME) technology	L6
	C107.5	Differentiate H.323, SIP and other protocols, frameworks for VoIP	L4
	C107.6	Analyze various security protocols and able to deal with security attacks in mobile environment	L4

Course Name	CO number with code	CO statement	BT level
Wireless LANS & PANS PSE 2	C108.1	Independently understand basic random access control protocols	L1
	C108.2	Enumerate the wireless and wired networks	L2
	C108.3	Understand the architecture of IEEE 802.11	L2
	C108.4	Acquaint knowledge on MAC protocol of IEEE 802.11	L3
	C108.5	Familiarity with wireless personal area networks	L2
	C108.6	Identify different PANs and familiarize with working group of IEEE 802.15	L6

Course Name	CO number with code	CO statement	BT level
Wireless and Mobile Communications Lab PCL-1	C109.1	Implement the advanced digital modulation techniques	L3
	C109.2	Design Convolutional encoder and decoder for error control coding techniques	L6
	C109.3	Calculate path loss for Free space, Okumura and Hata models for outdoor propagation	L3
	C109.4	Comprehend Cellular concepts of GSM and CDMA networks	L2
	C109.5	Simulate RAKE receiver for CDMA with MATLAB.	L3
	C109.6	Analyze GSM architecture	L4

Course Name	CO number with code	CO statement	BT level
Adhoc Wireless Networks Lab PCL-2	C110.1	Carry out simulation of various LAN topologies using network simulators	L6
	C110.2	Distinguish between various queue management schemes and scheduling mechanisms in wireless environment	L6
	C110.3	Evaluate the performance of various transport and routing protocols in MANETs	L6
	C110.4	Compare the performance of IEEE 802.11 and IEEE 802.15.4	L2
	C110.5	Analyze various Internet packets and protocols using Wireshark	L4
	C110.6	Analyze OFDM spectrum and CDMA system	L4

Course Name	CO number with code	CO statement	BT level
Research Methodology and IPR PW	C111.1	Describe research problem formulation.	L1
	C111.2	Analyze research related information.	L4
	C111.3	Follow research ethics.	L3
	C111.4	Understand the new developments in Intellectual Property Right.	L2
	C111.5	Develop patent grants.	L6
	C111.6	Create new and better products, and in turn brings about, economic growth and social benefits.	L6

Course Name	CO number with code	CO statement	BT level
ENGLISH FOR RESEARCH PAPER WRITING AC 1	C112.1	The student will be able to understand the nuances of research wri	L2
	C112.2	The student will be able to write a research paper with required wr	L3
	C112.3	The student will be able to publish a paper using the requisite stan	L6
	C112.4	The student will be able to review the research papers and articles	L5
	C112.5	The student will be able to work on citations and ably place them	L3
	C112.6	The student will be able to avoid plagiarism and be able to develo	L2

Course Name	CO number with code	CO statement	BT level
DISASTER MANAGEMENT AC 1	C113.1	Learn different disasters and measures to reduce the risk due to the	L1
	C113.2	Learn institutional frame work for disaster management at nationa	L1
	C113.3	Develop the capacity to integrate knowledge and to analyze, evalu	L6
	C113.4	Demonstrate, describe, analyze and evaluate the environmental, so	L5
	C113.5	Understand the emergency/disaster management cycle for various	L2
	C113.6	Develop a basic understanding of prevention, mitigation, prepared	L6

Course Name	CO number with code	CO statement	BT level
PEDAGOGY STUDIES AC1	C114.1	The pedagogical practices followed by teachers in developing cou	L2
	C114.2	To examine the effectiveness of pedagogical practices.	L4
	C114.3	To understand the concept, characteristics and types of educationa	L2
	C114.4	The role of teacher education, school curriculum and guidance ma	L2

Course Name	CO number with code	CO statement	BT level
PERSONALITY DEVELOPMENT THROUGH LIFE ENLIGHTENMENT SKILLS	C115.1	Develop their personality and achieve their highest goal of life.	L6
	C115.2	Lead the nation and mankind to peace and prosperity.	L4
	C115.3	Develop versatile personality.	L6

Course Name	CO number with code	CO statement	BT level
Advanced Communications Systems PC 3	C116.1	Gain the fundamental concepts of spread spectrum concepts in wireless communication system	L1
	C116.2	Apply space time coding in MIMO system.	L3
	C116.3	Develop channel modelling of a MIMO system.	L6
	C116.4	Analyze mathematical representation of OFDM system	L4
	C116.5	Estimate channel in OFDM environment	L5
	C116.6	Comprehend SONET, ATM, ATM traffic and congestion control.	L2

Course Name	CO number with code	CO statement	BT level
Wireless Sensor Networks PC 4	C117.1	Analyze various issues in sensor networks.	L3
	C117.2	Identify various sensor platforms and supporting protocols.	L1
	C117.3	Acquaint with various sensor network simulators and sensor network programming.	L2
	C117.4	Identify different operating systems for the implementation and deployment of wireless sensor networks.	L4
	C117.5	Design MAC, routing and transport protocols for wireless sensor networks.	L6
	C117.6	Comprehend Security mechanisms attacks sensor network.	L1

Course Name	CO number with code	CO statement	BT level
Digital Image & Video Processing PSE 3	C118.1	Analyze various advanced Image transforms	L2
	C118.2	Understand different techniques employed for the Enhancement of images both in Spatial & Frequency domain	L2
	C118.3	Explore image degradation and various restoration techniques	L5
	C118.4	Study the concepts of Colour Image Processing.	L4
	C118.5	Demonstrate the basic concepts in Video Processing	L4
	C118.6	Compare the various Image and Video Compression Techniques	L3

Course Name	CO number with code	CO statement	BT level
Network Security & Cryptography PSE 3	C119.1	Identify some of the factors driving the need for network security	L1
	C119.2	Analyze the vulnerabilities in any computing system and hence be able to design a security solution	L4
	C119.3	Compare and contrast symmetric and asymmetric encryption systems and their vulnerability to attack, and explain the characteristics of hybrid systems	L2
	C119.4	Effectively apply relevant standards, ethical considerations, and an understanding of privacy issues to designing secure networks	L3
	C119.5	Understand the standard security services and mechanisms used to provide confidentiality, integrity and authenticity	L2
	C119.6	Apply the knowledge and abide by the legal framework that governs computer and information systems	L3

Course Name	CO number with code	CO statement	BT level
MIMO Systems PSE 3	C120.1	Perform Mathematical modeling of a MIMO systems	L3
	C120.2	Analyze the performance of different diversity techniques	L4
	C120.3	Derive channel capacity of a MIMO system	L5
	C120.4	Apply the Space-Time coding in MIMO system	L3
	C120.5	Comprehend multi-user communication in MIMO	L2
	C120.6	Identify the appropriate multiplexing architecture for the given environment	L5

Course Name	CO number with code	CO statement	BT level
Cognitive Radio PSE 4	C121.1	Gain the fundamental concepts of cognitive radio networks	L2
	C121.2	Develop the cognitive radio, as well as techniques for spectrum holes detection that cognitive radio takes advantages in order to exploit it	L4
	C121.3	Identify technologies to allow an efficient use of TVWS for radio communications based on two spectrum sharing business models/policies.	L6
	C121.4	Identify the fundamental issues regarding dynamic spectrum access	L6
	C121.5	Analyze the radio-resource management and trading in cognitive radio network.	L4
	C121.6	Investigate optimization techniques for better spectrum exploitation	L3

Course Name	CO number with code	CO statement	BT level
4G Technologies PSE 4	C122.1	Explain and compare Second and Third Generation technologies, their architectures.	L2
	C122.2	Describe improved version of 2G technology i.e., evolution Generation (2.5G)	L4
	C122.3	Define 4G technologies, their applications in modern wireless communication systems	L3
	C122.4	Evaluate the performance of OFDM system in fading environment	L5
	C122.5	Differentiate various hybrid multiple access schemes used in 4G systems	L4
	C122.6	Demonstrate the knowledge about UWB wireless channels.	L4

Course Name	CO number with code	CO statement	BT level
Advanced Digital Signal Processing PSE 4	C123.1	Design and Analyse the digital filters.	L6
	C123.2	Acquire the basics of Multi rate digital signal processing and applications.	L2
	C123.3	Understand the concepts of Linear Prediction	L2
	C123.4	Analyse the different Power Spectrum Estimation methods	L4
	C123.5	Comprehend the Finite word length effects in DSP Systems	L2

Course Name	CO number with code	CO statement	BT level
Advanced Communications Systems Lab PCL 3	C124.1	Implement CDMA Technique in multi-user environment	L3
	C124.2	Measure Peak Cell Rate (per Sec) and Cell Delay Variation Tolerance (CVDT) for ATM networks.	L3
	C124.3	Analyze the effect of different class of services such as CBR and VBR on network Performance	L4
	C124.4	Measure channel capacity of MIMO system.	L3
	C124.5	Design OFDM Transceiver using Software Radio	L6
	C124.6	Develop solutions to PAPR issue in OFDM systems	L6

Course Name	CO number with code	CO statement	BT level
Wireless Sensor Networks Lab PCL 4	C125.1	Acquaint with the knowledge of programming in nesC	L3
	C125.2	Understand programming of sensor motes	L2
	C125.3	Familiarity with the programming of arduino and raspberry pi.	L1
	C125.4	Understand and build the skills required to upload sensor data to the Internet	L6
	C125.5	Demonstrate knowledge on working with real-time signals using LABView	L3

Course Name	CO number with code	CO statement	BT level
Mini Project PW	C126.1	Understand the process of conducting research in Wireless Mobile Communication Engineering.	L2
	C126.2	Ability to work individually in solving research problems.	L3
	C126.3	Ability to handle research based on the suitable methodology and observation method.	L6
	C126.4	Ability to analyze and discuss critically research outcomes and, also the capability to obtain information for the development of the research.	L4
	C126.5	Ability to present the research outcome scientifically through thesis/dissertation writing to document the findings of research;	L5
	C126.6	Ability to present scientific study outcome verbally.	L5

Course Name	CO number with code	CO statement	BT level
SANSKRIT FOR TECHNICAL KNOWLEDGE AC-2	C127.1	Gain knowledge in basic SANSKRIT language.	L2
	C127.2	Understand the ancient SANSKRIT literature about Science & Tec	L2
	C127.3	Develop logical and analytical skills	L6

Course Name	CO number with code	CO statement	BT level
VALUE EDUCATION (AC-2)	C128.1	Gain knowledge on self-development.	L2
	C128.2	Learn the importance of Human Values.	L5
	C128.3	Develop overall personality	L6

Course Name	CO number with code	CO statement	BT level
CONSTITUTION OF INDIA (AC-2)	C129.1	Get the clarity and idea about function of Indian constitution.	L2
	C129.2	Understand the Rights of equality, the Right of freedom and the R	L2
	C129.3	Grab the knowledge of union government & their powers and fun	L4
	C129.4	Understand state and central policies, fundamental duties.	L2
	C129.5	Understand powers and functions of Municipalities, Panchayats a	L2
	C129.6	Understand Electoral Process, special provisions.	L2

Course Name	CO number with code	CO statement	BT level
STRESS MANAGEMENT BY YOGA (AC-2)	C130.1	Enhancement of Physical strength and flexibility.	L5
	C130.2	Learn to relax and focus.	L3
	C130.3	Relieves physical and mental tension.	L3
	C130.4	Improved work performance/ efficiency	L3

<mark>**M.TECH III Semester**</mark>

Course Name	CO number with code	CO statement	BT level
Voice over Internet Protocol PSE 5	C201.1	Understand various concepts related to IPV4, IPV6 and RTP.	L2
	C201.2	Illustrate various challenges in the implementation of VOIP and modifications required to meet these challenges.	L2
	C201.3	Demonstrate knowledge about various protocols developed for the implementation of VOIP.	L2
	C201.4	Analyze the message formats used in H.323 and SIP Protocols.	L4
	C201.5	Handle the QOS requirements in VOIP and various protocols developed to ensure QOS.	L4
	C201.6	Implement internetworking of VOIP with already existing networks.	L3

Course Name	CO number with code	CO statement	BT level
Multimedia Communications PSE 5	C202.1	Get an idea of the history, applications of multimedia	L1
	C202.2	Get aware of tools related to multimedia, computer and multimedia networks	L1
	C202.3	Understand the formation of an image and various models of color in images, video	L2
	C202.4	Exposure to the types of video signals and digitization of audio signals and corresponding compression techniques.	L3
	C202.5	Independently know core multimedia technologies and standards for image compressions.	L4
	C202.6	Gain the knowledge of various video compression standards	L5

Course Name	CO number with code	CO statement	BT level
Microcontroller & Embedded System Design PSE 5	C203.1	Understand basic structure and concepts used in embedded systems	L1
	C203.2	Apply the knowledge of microcontroller in embedded systems	L3
	C203.3	Interface microcontroller with peripherals	L6
	C203.4	Introduces concepts of Real – Time Operating Systems (RTOS)	L2
	C203.5	Design, and implement an embedded system using RTOS	L6

Course Name	CO number with code	CO statement	BT level
BUSINESS ANALYTICS (OE -1)	C204.1	Knowledge of data analytics.	L1
	C204.2	Think critically in making decisions based on data analytics.	L4
	C204.3	Identify the befitting descriptive tool required for the business pro	L3
	C204.4	Identify appropriate prescriptive modelling technique for decision	L5
	C204.5	Apply suitable predicative method that supports business decision	L3
	C204.6	Translate data into clear, actionable insights in the decision makin	L6

Course Name	CO number with code	CO statement	BT level
INDUSTRIAL SAFETY (OE -1)	C205.1	Know the need for safety in industries	L2
	C205.2	Know about factory acts and industrial safety regulations	L5
	C205.3	Analyse causes and types of different hazards on their preventions	L4
	C205.4	Assess quality maintenance processes and maintenance work qual	L5
	C205.5	Assess safety practices and programs.	L5
	C205.6	Know about periodic and preventive maintenance activities in ind	L5

Course Name	CO number with code	CO statement	BT level
	C206.1	Apply linear programming models to several Engineering Applica	L3
	C206.2	Able to apply the concept of nonlinear programming.	L3
	C206.3	In Dynamic Programming selected models were taught.	L2
	C206.4	Apply simple mathematical models in Inventory into the real Engi	L3
OPERATIONS RESEARCH	C206.5	Solve Game theory problems related to business applications	L3
(OE -1)	C206.6	To minimize waiting time of the customer and optimization of nur	L3

Course Name	CO number with code	CO statement	BT level
	C207.1	Perceive the cost associated in managing engineering projects	L2
	C207.2	Prepare budgets for engineering projects.	L3
	C207.3	Enumerate and effectively handle the inventory management in re	L4
	C207.4	Envelope the cost associated in price fixation of the projects.	L6
GEMENT OF ENGINEERIN	C207.5	Orient the cost management decision-making using quantitative m	L5
(OE -1)	C207.6	Furnish effective cost management practices for better handling of	L5

Course Name	CO number with code	CO statement	BT level
	C208.1	Students will learn different composite materials and their applica	L3
	C208.2	Students will have capacity to integrate knowledge and to analyse	L4
	C208.3	Develop different types of metal/ceramic/polymer matrix composi	L6
COMPOSITE MATERIALS	C208.4	Critically enhance strength of the composite materials through Lai	L3
(OE -1)			

Course Name	CO number with code	CO statement	BT level
	C209.1	Understand the methods of recycling of waste.	L2
	C209.2	Compare the methods of waste disposal.	L3
	C209.3	Identify different sources of energy from waste.	L3
	C209.4	Analyze methods for management of waste.	L4
ENERGY FROM WASTE	C209.5	Understand the global trade in hazardous waste	L2
(OE -1)	C209.6	Utilize different sources of energy from waste in an efficient and e	L5

Course Name	CO number with code	CO statement	BT level
	CO		
	C210.1	Analyse solar thermal and photovoltaic systems and related techno	L4
	C210.2	Understand Wind energy conversion and devices available for it	L2
	C210.3	Understand Biomass conversion technologies, Geo thermal resour	L3
	C210.4	Realize Power from oceans (thermal, wave, tidal) and conversion	L3

| OM RENEWABLE ENERGY | C210.5 | Understand fundamentals of fuel cells and commercial batteries | L2 |
| (OE -1) | C210.6 | Suggest suitable method of power generation for a particular region | L4 |

Course Name	CO number with code	CO statement	BT level
Project Phase-I	C211.1	Research literature to identify existing solutions to practical engineering problems and gain insight into new and better ways of solving it.	L4
	C211.2	Demonstrate effectively the solutions to complex engineering problems to the engineering community and with society at large.	L3
	C211.3	Implement solutions for complex engineering problems and design system components or processes that meet the specified requirements.	L6
	C211.4	Document the complete design cycle in a precise and succinct manner.	L5
	C211.5	Work as a part of diverse team to deliver best quality deliverables.	L3

Course Name	CO number with code	CO statement	BT level
Project Phase-II	C212.1	Research literature to identify existing solutions to practical engineering problems and gain insight into new and better ways of solving it.	L4
	C212.2	Demonstrate effectively the solutions to complex engineering problems to the engineering community and with society at large.	L3
	C212.3	Implement solutions for complex engineering problems and design system components or processes that meet the specified requirements.	L6
	C212.4	Document the complete design cycle in a precise and succinct manner.	L5
	C212.5	Work as a part of diverse team to deliver best quality deliverables.	L3