Mar Baselios Christian College of Engineering and Technology

Department of Electrical and Electronics Engineering

2019-2024 Scheme

Semester	Course Code KTU	Course Code NBA	Name of the Course	CO Code	Course Outcome Statement	Program Outcomes (Enter corelation Levels 1(Low), 2(Moderate) and 3(High)													
						PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO 11	PO 12	PSO 1	PSO 2
I	MAT101	D101	Linear Algebra and calculus	D101.1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms	3	3	3	3	2	1	-	-	1	2	-	2	1	1
				D101.2	Compute the partial and total derivatives and maxima and minima of multivariable functions	3	3	3	3	2	1	-	-	1	2	-	2	1	1
				D101.3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas	3	3	3	3	2	1	-	-	1	2	-	2	1	1
				D101.4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent	3	2	3	2	1	1	-	-	1	2	-	2	1	1
				D101.5	Determine the Taylor and Fourier series expansion of functions and learn their applications.	3	3	3	3	2	1	-	-	1	2	-	2	1	1
I	PHT100	D102	Engineering Physics A	D102.1	Compute the quantitative aspects of waves and oscillations in engineering systems.	3	2	-	-	-	-	-	1	2	-	-	1	1	1
				D102.2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments	3	2	-	-	-	-	-	1	2	-	-	1	1	1
				D102.3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.	3	2	-	-	-	-	-	1	2	-	-	1	1	1
				D102.4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems	3	2	-	-	-	-	-	1	2	-	-	1	1	1
				D102.5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system	3	2	-	-	-	-	-	1	2	-	-	1	1	1
II	EST110	D103	Engineering Graphics	D103.1	Draw the projection of points and lines located in different quadrants	3	-	-	-	-	-	-	-	-	-	-	2	2	-
				D103.2	Prepare multiview orthographic projections of objects by visualizing them in different positions	3	-	-	-	-	-	-	-	-	-	-	3	1	-
				D103.3	Draw sectional views and develop surfaces of a given object	3	1	-	-	-	-	-	-	-	-	-	3	2	-
				D103.4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.	3	-	-	-	-	-	-	-	-	1	-	2	2	-
				D103.5	Convert 3D views to orthographic views	3	-	-	-	-	-	-	-	-	2	-	2	2	-
				D103.6	Obtain multiview projections and solid models of objects using CAD tools	3	-	-	-	3	-	-	-	-	3	-	3	2	-
I	EST120	D104	Basics of Civil and Mechanical Engineering	D104.1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.	3	-	-	-	-	3	2	2	-	-	-	-	-	-
				D104.2	Explain different types of buildings, building components, building materials and building construction	3	2	-	1	3	-	-	3	-	-	-	-	-	-
				D104.3	Describe the importance, objectives and principles of surveying	3	2	-	-	3	-	-	-	2	-	-	-	-	-
				D104.4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps	3	2	-	-	3	-	-	-	2	-	-	-	2	-
				D104.5	Discuss the Materials, energy systems, water management and environment for green buildings.	3	2	-	-	3	2	3	-	2	-	-	-	2	-
				D104.6	Analyse thermodynamic cycles and calculate its efficiency	3	2	-	-	-	-	-	-	-	-	-	-	2	2
				D104.7	Illustrate the working and features of IC Engines	3	1	-	-	-	-	-	-	-	-	-	-	2	-
				D104.8	Explain the basic principles of Refrigeration and Air Conditioning	3	1	-	-	-	-	-	-	-	-	-	-	-	-
				D104.9	Describe the working of hydraulic machines	3	1	-	-	-	-	-	-	-	-	-	-	2	2
				D104.10	Explain the working of power transmission elements	3	1	-	-	-	-	-	-	-	-	-	-	-	-
				D104.11	Describe the basic manufacturing, metal joining and machining processes	3	-	-	-	-	-	-	-	-	-	-	-	2	2
I	HUN101	D105	Life Skills	D105.1	Define and Identify different life skills required in personal and professional life	-	-	-	-	-	2	-	1	2	2	1	3	1	1
				D105.2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.	-	-	-	-	-	-	-	-	3	-	-	2	1	1
				D105.3	Explain the basic mechanics of effective communication and demonstrate these through presentations.	-	-	-	-	-	1	-	-	1	3	-	-	1	1
				D105.4	Take part in group discussions	-	-	-	-	-	-	-	-	-	3	-	1	1	1

				D105.5	Use appropriate thinking and problem solving techniques to solve new problems	-	3	2	1	-	-	-	-	-	-	-	-	1	1
				D105.6	Understand the basics of teamwork and leadership	-	-	-	-	-	1	-	-	3	-	-	-	1	1
I	PHL120	D106	Engineering Physics Lab	D106.1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories	3	-	-	-	3	-	-	1	2	-	-	1	1	1
				D106.2	Understand the need for precise measurement practices for data recording	3	-	-	-	3	-	-	1	2	-	-	1	1	1
				D106.3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations	3	-	-	-	3	-	-	1	2	-	-	1	1	1
				D106.4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics	3	-	-	-	3	-	-	1	2	-	-	1	1	1
				D106.5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results	3	-	-	-	3	-	-	1	2	-	-	1	1	1
I	ESL120	D107	Civil & Mechanical Workshop	D107.1	Name different devices and tools used for civil engineering measurements	1	-	-	-	-	-	-	-	2	1	-	1	1	-
				D107.2	Explain the use of various tools and devices for various field measurements	1	-	-	-	-	-	-	-	-	1	-	1	1	-
				D107.3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.	1	-		-	-	-	-	-	-	-	-	1	1	-
				D107.4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing	1	-	-	-	-	-	-	-	2	1	-	1	1	-
				D107.5	Compare different techniques and devices used in civil engineering measurements	1	-	-	-	-	-	-	-	-	-	-	-	-	-
				D107.6	Identify Basic Mechanical workshop operations in accordance with the material and objects	2	-	-	-	-	-	-	-	-	-	-	-	-	-
				D107.7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades	2	-	-	-	-	-	-	-	-	-	-	-	-	-
				D107.8	Apply appropriate safety measures with respect to the mechanical workshop trades	2	-	-	-	-	-	-	-	-	-	-	-	-	-
II	MAT102	D108	Vector Calculus, Differential Equations And	D108.1	Compute the derivatives and line integrals of vector functions and learn their applications	3	3	3	3	2	1	-	-	1	2	-	2	1	-
				D108.2	Evaluate surface and volume integrals and learn their inter-relations and applications	3	3	3	3	2	1	-	-	1	2	-	2	1	-
				D108.3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients	3	3	3	3	2	1	-	-	1	2	-	2	-	1
				D108.4	Compute Laplace transform and apply them to solve ODEs arising in engineering	3	3	3	3	2	1	-	-	1	2	-	2	-	1
				D108.5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering	3	3	3	3	2	1	-	-	1	2	-	2	-	1
II	CYT100	D109	Engineering Chemistry	D109.1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.	1	2	1	-	-	-	-	-	-	-	-	-	1	-
				D109.2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications	1	1	-	1	2	-	-	-	-	-	-	-	-	-
				D109.3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.	1	1	-	1	2	-	-	-	-	-	-	-	-	-
				D109.4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.	2	1	-	-	-	-	-	-	-	-	-	-	-	-
				D109.5	Study various types of water treatment methods to develop skills for treating wastewater.	1	-	-	1	-	-	3	-	-	-	-	-	-	-
0			echanics	D110.1	Recall principles and theorems related to rigid body mechanics	2	2	-	-	-	-	-	-	-	-	-	-	2	1
				D110.2	Identify and describe the components of system of forces acting on the rigid body	3	3	-	-	-	-	-	-	-	-	-	-	2	1

II	EST10	D110	Engineering M	D110.3	Apply the conditions of equilibrium to various practical problems involving different force system.	3	3	-	-	-	-	-	-	-	-	-	-	3	1
				D110.4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.	3	3	-	-	-	-	-	-	-	-	-	-	3	2
				D110.5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses	3	3	-	-	-	-	-	-	-	-	-	-	3	2
II	EST130	D111	Basics Of Electrical And Electronics Engineering	D111.1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits	3	1	-	-	-	-	-	-	-	-	-	2	3	1
				D111.2	Develop and solve models of magnetic circuits	3	1	-	-	-	-	-	-	-	-	-	2	3	1
				D111.3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state	3	1	-	-	-	-	-	-	-	-	-	2	3	1
				D111.4	Describe working of a voltage amplifier	2	-	-	-	-	-	-	-	-	-	-	-	1	1
				D111.5	Outline the principle of an electronic instrumentation system	2	-	-	-	-	-	-	-	-	-	-	2	1	1
				D111.6	Explain the principle of radio and cellular communication	2	-	-	-	-	-	-	-	-	-	-	2	1	1
II	HUN102	D112	Professional Communication	D112.1	Develop vocabulary and language skills relevant to engineering as a profession	-	-	-	-	-	-	-	-	-	3	-	2	2	3
				D112.2	Analyze, interpret and effectively summarize a variety of textual content	-	-	-	-	-	-	-	-	-	1	-	3	2	3
				D112.3	Create effective technical presentations	-	-	-	-	-	1	-	-	1	3	-	-	3	3
				D112.4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus	-	-	-	-	-	-	-	-	-	3	-	1	3	2
				D112.5	Identify drawbacks in listening patterns and apply listening techniques for specific needs	-	1	-	-	-	-	-	-	2	3	-	-	2	2
				D112.6	Create professional and technical documents that are clear and adhering to all the necessary conventions	1	-	-	-	-	1	-	-	1	3	-	-	3	3
II	EST102	D113	Programming In C	D113.1	Analyze a computational problem and develop an algorithm/flowchart to find its solution	2	2	1	2	-	2	-	-	-	3	-	1	1	2
				D113.2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators	2	1	2	1	1	-	-	-	2	1	-	2	2	2
				D113.3	Write readable C programs with arrays, structure or union for storing the data to be processed	2	1	2	1	1	-	-	-	-	1	-	2	1	1
				D113.4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem	2	2	2	1	1	-	-	-	-	2	1	1	2	1
				D113.5	Write readable C programs which use pointers for array processing and parameter passing	2	1	-	-	1	-	-	-	-	1	-	1	1	1
				D113.6	Develop readable C programs with files for reading input and storing output	2	1	-	-	1	-	-	-	-	1	-	1	1	1
II	CYL120	D114	Engineering Chemistry Lab	D114.1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses	3	-	-	-	2	-	-	-	-	-	-	3	-	-
				D114.2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs	3	-	-	-	3	-	-	-	-	-	-	3	-	-
				D114.3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds	3	-	-	-	3	-	-	-	-	-	-	3	-	-
				D114.4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis	3	-	-	-	3	-	-	-	-	-	-	3	-	-
				D114.5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments	3	-	-	-	1	-	-	-	-	-	-	3	-	1
				D114.6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum	3	-	-	-	1	-	-	-	-	-	-	3	-	1
II	SL 130	D115	ectronics Workshop	D115.1	Demonstrate safety measures against electric shocks.	-	-	-	-	-	3	-	-	-	-	-	1	3	3
				D115.2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	2	-	-	-	-	-	-	-	-	1	-	2	3	3
				D115.3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings	2	-	-	1	-	1	-	1	2	2	-	2	3	3

	ES		Electrical & El	D115.4	Identify and test various electronic components	3	-	-	-	-	-	-	-	-	-	-	2	3	3
				D115.5	Draw circuit schematics with EDA tools	3	-	-	-	2	-	-	-	-	-	-	2	3	3
				D115.6	Assemble and test electronic circuits on boards	3	-	-	-	2	-	-	-	-	-	-	1	3	3
				D115.7	Work in a team with good interpersonal skills	-	-	-	-	-	-	-	-	3	2	-	2	3	3
III	MAT 201	D201	Partial Differential Equations And Complex Analysis	D201.1	Understand the concept and the solution of partial differential equation.	3	3	3	3	2	1	-	-	-	2	-	2	1	-
				D201.2	Analyse and solve one dimensional wave equation and heat equation.	3	3	3	3	2	1	-	-	-	2	-	2	1	-
				D201.3	Understand complex functions, its continuity differentiability with the use of Cauchy Riemann equations	3	3	3	3	2	1	-	-	-	2	-	2	-	1
				D201.4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function	3	3	3	3	2	1	-	-	-	2	-	2	-	1
				D201.5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals	3	3	3	3	2	1	-	-	-	2	-	2	-	1
III	EET201	D202	Circuits And Networks	D202.1	Apply circuit theorems to simplify and solve complex DC and AC electric networks.	3	3	-	-	-	-	-	-	-	-	-	2	3	3
				D202.2	Analyse dynamic DC and AC circuits and develop the complete response to excitations.	3	3	-	-	-	-	-	-	-	-	-	2	3	3
				D202.3	Solve dynamic circuits by applying transformation to s-domain	3	3	-	-	-	-	-	-	-	-	-	2	3	3
				D202.4	Analyse three-phase networks in Y and Δ configurations.	3	3	-	-	-	-	-	-	-	-	-	2	3	3
				D202.5	Solve series /parallel resonant circuits.	3	3	-	-	-	-	-	-	-	-	-	2	3	3
				D202.6	Develop the representation of two-port networks using network parameters and analyse.	3	3	-	-	-	-	-	-	-	-	-	2	3	3
III	EET203	D203	Measurements And Instrumentation	D203.1	Identify and analyse the factors affecting performance of measuring system	2	1	-	-	-	-		-	-	-	-	-	2	2
				D203.2	Choose appropriate instruments for the measurement of voltage, current in ac and dc measurements	3	1	-	-	-	-	-	-	-	-	-	-	2	2
				D203.3	Explain the operating principle of power and energy measurement	3	1	-	-	-	-	-	-	-	-	-	-	2	2
				D203.4	Outline the principles of operation of Magnetic measurement systems	3	-	-	-	-	-	-	-	-	-	-	-	2	2
				D203.5	Describe the operating principle of DC and AC bridges, transducers based systems.	3	-	-	-	1	-	-	-	-	-	-	2	2	2
				D203.6	Understand the operating principles of basic building blocks of digital systems, recording and display units	3	-	-	-	2	-	-	-	-	-	-	2	2	2
III	EET205	D204	Analog Electronics	D204.1	Design biasing scheme for transistor circuits.	2	2	2	-	-	-	-	-	-	-	-	-	3	3
				D204.2	Model BJT and FET amplifier circuits.	2	2	2	-	-	-	-	-	-	-	-	-	3	3
				D204.3	Identify a power amplifier with appropriate specifications for electronic circuit applications	-	-	1	2	-	-	-	-	-	-	-	-	2	3
				D204.4	Describe the operation of oscillator circuits using BJT.	2	2	2	-	-	-	-	-	-	-	-	-	2	3
				D204.5	Explain the basic concepts of Operational amplifier(OP-AMP)	-	-	1	2	-	-	-	-	-	-	-	-	2	3
				D204.6	Design and develop various OP-AMP application circuits	2	2	2	-	-	-	-	-	-	-	-	-	2	3
III	EST200	D205	Design And Engineering	D205.1	Explain the different concepts and principles involved in design engineering.	2	1	-	-	-	-	1	-	-	1	-	-	1	1
				D205.2	Apply design thinking while learning and practicing engineering.	-	2	-	-	-	1	-	1	-	-	-	2	1	1
				D205.3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering	-	-	2	-	-	1	1	-	2	1	-	1	1	1
III	MCN201	D206	Sustainable Engineering	D206.1	Understand the relevance and the concept of sustainability and the global initiatives in this direction	-	-	-	-	-	2	3	-	-	-	2	-	2	1
				D206.2	Explain the different types of environmental pollution problems and their sustainable solutions	-	-	-	-	-	2	3	-	-	-	2	-	2	2
				D206.3	Discuss the environmental regulations and standards	-	-	-	-	-	2	3	-	-	-	2	-	2	2
				D206.4	Outline the concepts related to conventional and non-conventional energy	-	-	-	-	-	2	3	-	-	-	2	-	3	2
				D206.5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles	-	-	-	-	-	2	3	-	-	-	2	-	3	3
				D207.1	Analyse voltage current relations of RLC circuits	3	3	2	-	-	-	-	-	2	-	-	3	3	3
				D207.2	Verify DC network theorems by setting up various electric circuits	3	3	-	-	-	-	-	-	2	-	-	3	3	3

III	EEL201	D207	Circuits And Measurements Lab	D207.3	Measure power in a single and three phase circuits by various methods	3	3	-	-	-	-	-	-	2	-	-	3	3	3
				D207.4	Calibrate various meters used in electrical systems	3	3	2	-	-	-	-	-	2	-	-	3	3	3
				D207.5	Determine magnetic characteristics of different electrical devices	3	3	-	-	-	-	-	-	2	-	-	3	3	3
				D207.6	Analyse the characteristics of various types of transducer systems	3	3	2	-	-	-	-	-	2	-	-	3	3	3
				D207.7	Determine electrical parameters using various bridges	3	3	-	-	-	-	-	-	2	-	-	3	3	3
				D207.8	Analyse the performance of various electronic devices for an instrumentation systems and, to develop the team management and documentation capabilities.	3	3	3	3	2	-	-	-	3	3	3	3	3	3
III	EEL203	D208	Analog Electronics Lab	D208.1	Use the various electronic instruments and for conducting experiments	2	-	-	-	-	-	-	-	2	-	-	-	2	3
				D208.2	Design and develop various electronic circuits using diodes and Zener diodes.	2	2	2	-	-	-	-	-	2	-	-	-	2	3
				D208.3	Design and implement amplifier and oscillator circuits using BJT and JFET	2	2	2	-	-	-	-	-	2	-	-	-	2	3
				D208.4	Design and implement basic circuits using IC (OPAMP and 555 timers).	2	2	2	-	-	-	-	-	2	-	-	-	2	3
				D208.5	Simulate electronic circuits using any circuit simulation software.	1	1	-	-	3	-	-	-	3	-	-	-	1	3
				D208.6	Use PCB layout software for circuit design	1	-	-	-	3	-	-	-	3	-	-	-	1	3
IV	MAT 204	D209	Probability, Random Processes And Numerical Methods	D209.1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.	3	2	1	-	-	-	-	-	-	-	-	-	1	-
				D209.2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena.	3	2	1	-	-	-	-	-	-	-	-	-	1	-
				D209.3	Analyse random processes using autocorrelation, power spectrum and Poisson process model as appropriate.	3	2	1	-	-	-	-	-	-	-	-	-	1	-
				D209.4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques	3	2	1	-	-	-	-	-	-	-	-	-	1	-
				D209.5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.	3	2	1	-	-	-	-	-	-	-	-	-	1	-
IV	EET202	D210	Dc Machines And Transformers	D210.1	Acquire knowledge about constructional details of DC machines	3	-	-	-	-	-	-	-	-	-	-	-	3	-
				D210.2	Describe the performance characteristics of DC generators	3	3	-	-	-	-	-	-	-	-	-	-	3	-
				D210.3	Describe the principle of operation of DC motors and select appropriate motor types for different applications	3	2	2	-	-	-	-	-	-	-	-	-	3	-
				D210.4	Acquire knowledge in testing of DC machines to assess its performance	3	3	-	-	-	-	-	-	-	-	-	-	3	-
				D210.5	Describe the constructional details and modes of operation of single phase and three phase transformers	3	-	-	-	-	-	-	-	-	-	-	-	3	-
				D210.6	Analyse the performance of transformers under various conditions	3	-	-	-	-	-	-	-	-	-	-	-	3	-
IV	EET204	D211	Electromagnetic Theory	D211.1	Apply vector analysis and coordinate systems to solve static electric and magneticfield problems.	2	3	-	-	-	-	-	-	-	-	-	-	3	3
				D211.2	Apply Gauss Law, Coulomb's law and Poisson's equation to determine electrostatic field parameters	2	3	-	-	-	-	-	-	-	-	-	-	3	3
				D211.3	Determine magnetic fields from current distributions by applying Biot-Savart's law and Amperes Circuital law.	2	3	-	-	-	-	-	-	-	-	-	-	3	2
				D211.4	Apply Maxwell Equations for the solution of time varying fields	2	3	-	-	-	-	-	-	-	-	-	-	2	3
				D211.5	Analyse electromagnetic wave propagation in different media.	2	3	-	-	-	-	-	-	-	-	-	-	3	3
IV	EET206	D212	Digital Electronics	D212.1	Identify various number systems, binary codes and formulate digital functions using Boolean algebra	3	1	-	-	-	-	-	-	-	-	-	-	1	2
				D212.2	Design and implement combinational logic circuits.	3	3	2	-	-	-	-	-	-	-	-	-	1	2
				D212.3	Design and implement sequential logic circuits.	2	3	2	-	-	-	-	-	-	-	-	-	1	2
				D212.4	Compare the operation of various analog to digital and digital to analog conversion circuits.	3	2	-	-	-	-	-	-	-	-	-	-	1	2
				D212.5	Explain the basic concepts of programmable logic devices and VHDL.	3	2	2	-	2	-	-	-	-	-	-	-	1	2

IV	HUT200	D213	Professional Ethics	D213.1	Understand the core values that shape the ethical behaviour of a professional	-	-	-	-	-	-	-	2	-	-	2	-	1	1
				D213.2	Adopt a good character and follow an ethical life.	-	-	-	-	-	-	-	2	-	-	2	-	1	1
				D213.3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.	-	-	-	-	-	-	-	3	-	-	2	-	1	1
				D213.4	Solve moral and ethical problems through exploration and assessment by established experiments.	-	-	-	-	-	-	-	3	-	-	2	-	1	1
				D213.5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.	-	-	-	-	-	-	-	3	-	-	2	-	1	1
IV	MCN202	D214	Constitution Of India	D214.1	Explain the background of the present constitution of India and features	-	-	-	-	-	2	-	-	-	2	-	-	1	1
				D214.2	Utilize the fundamental rights and duties	-	-	-	-	-	2	-	-	-	2	-	-	1	1
				D214.3	Understand the working of the union executive, parliament and judiciary.	-	-	-	-	-	2	-	-	-	2	-	-	1	1
				D214.4	Understand the working of the state executive, legislature and judiciary	-	-	-	-	-	2	-	-	-	2	-	-	1	1
				D214.5	Utilize the special provisions and statutory institutions.	-	-	-	-	-	2	-	-	-	2	-	-	1	1
IV	EEL202	D215	Electrical Machines Lab I	D215.1	Analyse the performance of DC motors and DC generators by performing load test.	3	3	2	2	-	-	-	-	3	2	-	3	3	1
				D215.2	Sketch the Open Circuit Characteristics of a self excited DC shunt generator and check conditions of voltage build up by performing suitable experiment.	3	3	2	2	-	-	-	-	3	2	-	3	3	1
				D215.3	Develop equivalent circuit and predetermine their regulation and efficiency by performing OC & SC tests on transformer.	3	3	2	2	-	-	-	-	3	2	-	3	3	1
				D215.4	Analyse the efficiency and regulation of the transformer by performing load test	3	3	2	2	-	-	-	-	3	2	-	3	3	1
				D215.5	Analyse the efficiency of a DC machine when working as motor and generator by conducting suitable test.	3	3	2	2	-	-	-	-	3	2	-	3	3	1
				D215.6	Examine the efficiency by performing Sumpner's test on two similar transformers.	3	3	2	2	-	-	-	-	3	2	-	3	3	1
IV	EEL204	D216	Digital Electronics Lab	D216.1	Formulate digital functions using Boolean Algebra and verify experimentally.	3	1	1	3	3	-	-	-	2	3	3	-	1	2
				D216.2	Design and implement combinational logic circuits	3	3	3	3	3	-	-	-	2	3	3	-	1	2
				D216.3	Design and implement sequential logic circuits.	3	3	3	3	3	-	-	-	2	3	3	-	1	2
				D216.4	Design and fabricate a digital circuit using the knowledge acquired from the laboratory	3	2	1	3	2	-	-	-	2	3	3	2	1	2
V	EET301	D301	Power System 1	D301.1	Identify the power generating system appropriate for a given area.	3	-	-	-	-	2	-	2	-	-	1	2	3	2
				D301.2	Evaluate the electrical performance of any transmission line.	3	3	-	-	-	-	-	-	-	-	-	-	3	-
				D301.3	Compute various physical characteristics of underground and overhead transmission systems.	3	2	-	-	-	2	2	2	-	-	-	-	3	1
				D301.4	Select appropriate switchgear for protection schemes	3	1	-	-	-	2	-	2	-	-	-	1	3	2
				D301.5	Design a simple electrical distribution system as per the standards	3	1	-	-	-	2	2	2	-	-	1	2	3	1
V	EET303	D302	Microprocessors And Microcontrollers	D302.1	Describe the architecture and timing diagram of 8085 microprocessor	3	2	-	-	-	-	-	-	-	-	-	-	1	2
				D302.2	Develop assembly language programs in 8085 microprocessor	3	2	3	2	1	-	-	-	-	-	-	-	1	2
				D302.3	Identify the different ways of interfacing memory and I/O with 8085 microprocessor	3	2	2	2	2	-	-	-	-	-	-	-	1	2
				D302.4	Understand the architecture of 8051 microcontroller and embedded systems.	3	2	-	-	-	-	-	-	-	-	-	-	1	2
				D302.5	Develop assembly level and embedded C programs in 8051 microcontroller.	3	2	3	2	1	1	-	-	-	-	-	1	1	2
V	EET305	D303	Signals And Systems	D303.1	Explain the basic operations on signals and systems	3	3	-	-	2	-	-	-	-	-	-	1	3	1
				D303.2	Apply Fourier Series and Fourier Transform concepts for continuous time signals.	3	3	3	-	-	-	-	-	-	-	-	1	3	1
				D303.3	Analyse the continuous time systems with Laplace Transform.	3	3	3	-	2	-	-	-	-	-	-	2	3	1
				D303.4	Analyse the discrete time system using Z Transform.	3	3	3	-	2	-	-	-	-	-	-	2	3	1
				D303.5	Apply Fourier Series and Fourier Transform concepts for Discrete time domain.	3	3	3	-	-	-	-	-	-	-	-	2	3	1
				D303.6	Describe the concept of stability of continuous time systems and sampled data systems.	3	3	-	-	2	-	-	-	-	-	-	1	3	1

V	EET307	D304	Synchronous And Induction Machines	D304.1	Analyse the performance of different types of alternators.	2	2	-	-	-	2	-	-	-	-	-	2	2	3
				D304.2	Analyse the performance of a synchronous motor.	3	3	2	-	-	2	-	-	-	-	-	2	2	3
				D304.3	Analyse the performance of different types of induction motors.	2	3	2	-	-	2	-	-	-	-	-	2	2	3
				D304.4	Describe operating principle of induction machine as generator	2	3	2	-	-	2	-	-	-	-	-	2	2	3
				D304.5	Explain the types of single phase induction motors and their working principle.	3	2	-	-	-	2	-	-	-	-	-	2	2	3
V	HUT 300	D305	Industrial Economics & Foreign Trade	D305.1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand)	-	-	-	-	-	2	-	-	-	-	2	-	1	1
				D305.2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)	-	-	-	-	-	2	-	-	-	-	2	-	1	1
				D305.3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)	-	-	-	-	-	2	-	-	-	-	2	-	1	1
				D305.4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse)	-	-	-	-	-	2	-	-	-	-	2	-	1	1
				D305.5	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)	-	-	-	-	-	2	-	-	-	-	2	-	1	1
V	MCN 301	D306	Disaster Management	D306.1	Define and use various terminologies in use in disaster management parlance and CO1 organise each of these terms in relation to the disaster management cycle (Cognitive knowledge level: Understand).	-	2	-	-	-	2	-	-	-	2	-	2	2	-
				D306.2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand).	2	3	2	-	2	2	3	-	-	3	-	2	2	-
				D306.3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand).	2	3	2	2	2	2	3	-	-	3	-	2	2	-
				D306.4	Explain the core elements and phases of Disaster Risk Management and develop CO4 possible measures to reduce disaster risks across sector and community (Cognitive knowledge level: Apply)	3	3	3	-	2	2	3	-	-	-	-	2	2	-
				D306.5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand).	3	3	-	-	2	2	3	-	-	-	-	2	2	-
				D306.6	Explain the various legislations and best practices for disaster management and risk CO6 reduction at national and international level (Cognitive knowledge level: Understand).	3	-	-	-	-	2	3	3	-	-	-	2	2	-
V	EEL331	D307	Microprocessors And Microcontrollers Lab	D307.1	Develop and execute assembly language programs for solving arithmetic and logical problems using microprocessor/microcontroller	3	3	2	2	3	-	-	2	2	3	-	2	1	2
				D307.2	Design and Implement systems with interfacing circuits for various applications	3	3	2	2	3	-	-	2	2	3	-	2	1	2
				D307.3	Execute projects as a team using microprocessor/ microcontroller for real life applications.	3	3	3	3	3	3	3	3	3	3	2	2	1	2
V	EEL333	D308	Electrical Machines Lab II	D308.1	Analyse the performance of single phase and three phase induction motors by conducting suitable tests.	3	3	2	2	-	-	-	-	3	2	-	3	3	-
				D308.2	Analyse the performance of three phase synchronous machine from V and inverted V curves.	3	3	2	2	-	-	-	-	3	2	-	3	3	-
				D308.3	Analyse the performance of a three phase alternator by conducting suitable tests	3	3	2	2	-	-	-	-	3	2	-	3	3	-

VI	EET302	D309	Linear Control Systems	D309.1	Describe the role of various control blocks and components in feedback systems.	3	3	-	-	-	-	-	-	-	-	-	1	2	2
				D309.2	Analyse the time domain responses of the linear systems.	3	3	3	-	-	-	-	-	-	-	-	2	2	2
				D309.3	Apply Root locus technique to assess the performance of linear systems.	3	3	3	-	2	-	-	-	-	-	-	2	2	2
				D309.4	Analyse the stability of the given LTI systems.	3	3	3	-	-	-	-	-	-	-	-	3	2	2
				D309.5	Analyse the frequency domain response of the given LTI systems	3	3	3	-	2	-	-	-	-	-	-	3	2	2
				D309.6	Design compensators using time domain and frequency domain techniques.	3	3	3	2	-	-	-	-	-	-	-	3	2	2
VI	EET304	D310	Power Systems II	D310.1	Apply the per unit scheme for any power system network and compute the fault levels.	3	3	-	-	-	-	-	-	-	-	-	2	3	1
				D310.2	Analyse the voltage profile of any given power system network using iterative methods.	3	3	2	-	-	-	-	-	-	-	-	2	3	1
				D310.3	Analyse the steady state and transient stability of power system networks.	3	3	2	-	-	-	-	-	-	-	-	1	3	1
				D310.4	Model the control scheme of power systems.	3	2	-	-	-	-	-	-	-	-	-	-	3	1
				D310.5	Schedule optimal generation scheme.	3	3	1	-	-	-	-	-	-	-	3	1	3	1
VI	EET306	D311	Power Electronics	D311.1	Explain the operation of modern power semiconductor devices and its characteristics.	3	1	-	1	-	-	-	-	-	-	-	-	2	3
				D311.2	Analyse the working of controlled rectifiers.	3	2	1	2	-	-	-	-	-	-	-	2	2	3
				D311.3	Explain the working of AC voltage controllers, inverters and PWM techniques.	2	3	-	-	-	-	-	-	-	-	-	-	2	3
				D311.4	Compare the performance of different dc-dc converters.	2	3	2	2	-	-	-	-	-	-	-	2	2	3
				D311.5	Describe basic drive schemes for ac and dc motors.	3	2	-	-	-	-	-	-	-	-	-	2	2	3
VI	EET322	D312	Renewable Energy Systems	D312.1	Describe the environmental aspects of renewable energy resources.	3	3	-	-	-	-	-	-	-	-	-	2	3	2
				D312.2	Explain the operation of various renewable energy systems.	3	3	-	-	-	-	-	-	-	-	-	2	3	2
				D312.3	Design solar PV systems	3	3	-	-	-	-	-	-	-	-	-	2	3	2
				D312.4	Explain different emerging energy conversion technologies and storage	3	3	-	-	-	-	-	-	-	-	-	2	3	2
VI	HUT310	D313	Management For Engineers	D313.1	Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).	2	-	-	-	1	2	2	2	-	2	1	1	1	1
				D313.2	Describe the functions of management (Cognitive Knowledge level: Understand).	2	-	-	-	1	1	-	2	1	2	1	1	1	1
				D313.3	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand).	2	2	2	2	1	-	-	-	-	-	-	-	1	1
				D313.4	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply)	2	2	2	2	1	-	-	-	-	-	2	1	1	1
				D313.5	Summarize the functional areas of management (Cognitive Knowledge level:(Understand).	2	-	-	-	-	1	1	-	1	2	1	-	1	1
				D313.6	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).	-	2	2	2	1	1	1	1	1	1	1	1	1	1
VI	EET308	D314	Comprehensive Course Work	D314.1	Apply the knowledge of circuit theorems to solve the problems in electrical networks	3	3	-	-	-	-	-	-	-	-	-	2	3	1
				D314.2	Evaluate the performance of DC machines and Transformers under different loading conditions	3	2	-	-	-	-	-	-	-	-	-	2	3	1
				D314.3	Identify appropriate digital components to realise any combinational or sequential logic.	3	3	1	-	1	-	-	-	-	-	-	2	3	1
				D314.4	Apply the knowledge of Power generation, transmission and distribution to select appropriate components for power system operation	3	3	-	-	-	1	1	1	-	-	1	2	3	1
				D314.5	Apply appropriate mathematical concepts to analyse continuous time and discrete time signals and systems	3	3	1	-	1	-	-	-	-	-	-	2	3	1
VI	EEL332	D315	Power Systems Lab	D315.1	Develop mathematical models and conduct steady state and transient analysis of power system networks using standard software	3	3	2	3	3	-	-	3	2	3	-	3	3	2
				D315.2	Develop a frequency domain model of power system networks and conduct the stability analysis	3	2	1	3	3	-		1	2	3	-	2	3	2
				D315.3	Conduct appropriate tests for any power system component as per standards.	3	1	1	3	3	3	1	3	3	3	-	3	3	2

				D315.4	Conduct site inspection and evaluate performance ratio of solar power plant.	3	1	1	3	3	3	3	3	3	3	2	3	3	2
VI	EEL334	D316	Power Electronics Lab	D316.1	Determine the characteristics of SCR and design triggering circuits for SCR based circuits	3	3	2	2	2	-	-	-	3	2	-	3	3	3
				D316.2	Design, set up and analyse single phase AC voltage controllers.	3	3	2	2	2	-	-	-	3	2	-	3	3	3
				D316.3	Design, set up and test suitable gate drives for MOSFET/IGBT.	3	3	2	2	2	-	-	-	3	2	-	3	3	3
				D316.4	Design, set up and test basic inverter topologies.	3	3	2	2	2	-	-	-	3	2	-	3	3	3
				D316.5	Design and set up dc-dc converters.	3	3	2	2	2				3	2		3	3	3
				D316.6	Develop simulation models of dc-dc converters, rectifiers and inverters using modern simulation tools	3	3	2	2	2	-	-	-	3	2	-	3	3	3
VII	EET401	D401	Advanced Control Systems	D401.1	Develop the state variable representation of physical systems.	3	3	-	-	-	-	-	-	-	-	-	2	2	2
				D401.2	Analyse the performance of linear and nonlinear systems using state variable approach	3	3	2	-	-	-	-	-	-	-	-	2	2	2
				D401.3	Design state feedback controller for a given system.	3	3	3	-	-	-	-	-	-	-	-	2	2	2
				D401.4	Explain the characteristics of nonlinear systems.	3	2	-	-	-	-	-	-	-	-	-	2	2	2
				D401.5	Apply the tools like describing function approach or phase plane approach for assessing the performance of nonlinear systems.	3	3	2	-	-	-	-	-	-	-	-	2	2	2
				D401.6	Apply Lyapunov method for the stability analysis of physical systems.	3	3	2	-	-	-	-	-	-	-	-	2	2	2
VII	EET413	D402	Electric Drives	D402.1	Describe the transient and steady state aspects electric drives	3	3	-	-	-	-	-	-	-	-	-	-	3	-
				D402.2	Apply the appropriate configuration of controlled rectifiers for the speed control of DC motors	3	3	3	-	-	-	-	-	-	-	-	-	3	2
				D402.3	Analyse the operation of chopper-fed DC motor drive in various quadrants.	3	3	3	-	-	-	-	-	-	-	-	-	3	2
				D402.4	Illustrate the various speed control techniques of induction motors.	3	3	3	-	-							-	3	2
				D402.5	Examine the vector control of induction motor drives.	3	3	3	-	-	-	-	-	-	-	-	-	3	2
				D402.6	Distinguish different speed control methods of synchronous motor drives	3	3	3	-	-	-	-	-	-	-	-	-	3	2
VII	EET 463	D403	Illumination Technology	D403.1	Explain the fundamental concepts of natural and artificial lighting schemes	3	2	-	-	-	-	-	-	-	-	-	-	3	2
				D403.2	Design efficient indoor lighting systems	2	2	3	-	-	-	1	-	-	-	-	1	3	2
				D403.3	Design efficient outdoor lighting systems	2	2	3	-	-	-	1	-	-	-	-	1	3	2
				D403.4	Describe aesthetic and emergency lighting systems	2	2	-	-	3	-	-	-	-	-	-	-	3	2
VII	MCN 401	D404	Industrial Safety Engineering	D404.1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)	2	3	-	-	-	2	2	2	-	-	-	1	1	1
				D404.2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand)	2	1	2	-	1	1	1	1	-	-	-	1	1	1
				D404.3	Explain different issues in construction industries. (Cognitive Knowledge level:Understand)	2	2	2	-	1	1	1	1	1	1	-	1	1	1
				D404.4	Describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand)	2	2	2	-	1	1	1	1	1	1	-	1	1	1
				D404.5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)	2	2	2	1	1	1	1	1	1	1	-	1	1	1
VII	MET 445	D405	ewable Energy Engineering	D405.1	Explain renewable energy sources and evaluate the implication of renewable energy to predict solar radiation at a location	3	2	-	-	-	-	2	-	-	-	-	-	1	1
				D405.2	Explain solar energy collectors, storages, solar cell characteristics and applications	3	2	-	-	-	-	-	-	-	-	-	-	1	1
				D405.3	Explain the different types of wind power machines and control strategies of wind turbines	3	2	1	-	-	-	2	-	-	-	-	-	1	-
				D405.4	Explain the ocean energy and conversion devices and different Geothermal sources	3	2	-	-	-	-	-	-	-	-	-	1	1	-

			Rene	D405.5	Explain biomass energy conversion devices. Calculate the Net Present value and payback period	3	2	-	-	-	-	1	-	-	-	-	-	1	1
VII	EEL411	D406	Control Systems Lab	D406.1	Develop mathematical models for servomotors and other electrical systems	3	3	2	3	3	-	-	3	3	3	-	3	3	2
				D406.2	Performance analysis of different process control systems	3	3	3	3	3	-		3	3	3	-	3	3	2
				D406.3	Performance analysis of different types of controllers	3	3	3	3	3	-	-	3	3	3	-	3	3	2
				D406.4	Use MATLAB and Simulink to design and analyse simple systems and compensators	3	3	3	3	3	-	-	3	3	3	-	3	3	2
VII	EEQ413	D407	Seminar	D407.1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).	2	2	1	1	-	2	1	-	-	-	-	3	2	2
				D407.2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).	3	3	2	3	-	2	1	-	-	-	-	3	2	2
				D407.3	Prepare a presentation about an academic document (Cognitive knowledge level: Create).	3	2	-	-	3	-	-	1	-	2	-	3	2	2
				D407.4	Give a presentation about an academic document (Cognitive knowledge level:Apply).	3	-	-	-	2	-	-	1	-	3	-	3	2	2
				D407.5	Prepare a technical report (Cognitive knowledge level:Create).	3	3	3	3	2	2	-	2	-	3	-	3	2	2
VII	EED415	D408	Project Phase I	D408.1	Model and solve real world problems by applying knowledge across domains(Cognitive knowledge level: Apply)	2	2	2	1	2	2	2	1	1	1	1	2	2	2
				D408.2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply)	2	2	2	-	1	3	3	1	1	-	1	1	2	2
				D408.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).	-	-	-	-	-	-	-	-	3	2	2	1	2	2
				D408.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).	-	-	-	-	2	-	-	3	2	2	3	2	2	2
				D408.5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).	2	3	3	1	2	-	-	-	-	-	-	1	2	2
				D408.6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).	-	-	-	-	2	-	-	2	2	3	1	1	2	2
VIII	EET402	D409	Electrical System Design and Estimation	D409.1	Explain the rules and regulations in the design of components for medium and high voltage installations	3	1	2	-	-	1	-	2	-	-	-	-	3	-
				D409.2	Design lighting schemes for indoor and outdoor applications.	3	2	3	-	-	1	1	1	-	-	-	1	3	1
				D409.3	Design low/medium voltage domestic and industrial electrical installations.	3	1	3	-	-	1	-	1	-	-	1	1	3	-
				D409.4	Design, testing and commissioning of 11kv transformer substation.	3	1	3	-	-	1	-	1	-	-	-	1	3	-
				D409.5	Design electrical installations in high rise buildings.	3	1	3	-	-	1	1	1	-	-	-	1	3	-
VIII	EET 424	D410	Energy Management	D410.1	Analyse the significance of energy management and auditing.	2	-	-	-	-	1	1	-	1	-	-	-	2	1
				D410.2	Discuss the energy efficiency and management of electrical loads.	2	-	1	1	-	1	1	-	-	-	-	-	2	1
				D410.3	Apply demand side management techniques.	2	-	1	1	-	1	1	-	-	-	-	-	2	1
				D410.4	Explain the energy management opportunities in industries	2	-	1	1	-	1	1	-	-	-	-	-	2	1
				D410.5	Compute the economic feasibility of the energy conservation measures.	2	-	-	-	-	-	-	-	-		2	-	2	1
VIII	EET 436	D411	Power Quality	D411.1	Identify the sources and effects of power quality problems.	3	2	-	-	-	2	-	1	-	-	-	2	3	2
				D411.2	Apply Fourier concepts for harmonic analysis.	3	3	-	-	-	-	-	-	-	-	-	2	3	2
				D411.3	Explain the important aspects of power quality monitoring	3	3	-	-	3	-	-	-	-	-	-	2	3	2
				D411.4	Examine power quality mitigation techniques.	3	3	2	-	-	-	-	1	-	-	-	2	3	2
				D411.5	Discuss power quality issues in grid connected renewable energy systems.	3	2	-	-	-	-	-	-	-	-	-	2	3	2
VIII	ET 418	D412	c And Hybrid Vehicles	D412.1	Explain the basic concepts of Conventional, Electric, Hybrid EV and Autonomous Vehicles	3	1	-	-	-	-	2	-	-	-	-	-	-	-
				D412.2	Describe different configurations of electric and hybrid electric drive trains	3	2	-	-	-	-	-	-	-	-	-	-	3	3
				D412.3	Discuss the propulsion unit for electric and hybrid vehicles	3	2	-	-	-	-	-	-	-	-	-	-	3	3

	E		Electric V	D412.4	Compare various energy storage and EV charging	3	3	2	-	-	-	-	-	-	-	-	-	3	-
				D412.5	Select drive systems and various communication protocols for EV	3	1	2	-	-	-	-	-	-	-	-	-	-	3
VIII	EED416	D413	Project Phase II	D413.1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).	2	2	2	1	2	2	2	1	1	1	1	2	2	2
				D413.2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).	2	2	2	-	1	3	3	1	1	-	1	1	2	2
				D413.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).	-	-	-	-	-	-	-	-	3	2	2	1	2	2
				D413.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).	-	-	-	-	2	-	-	3	2	2	3	2	2	2
				D413.5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).	2	3	3	1	2	-	-	-	-	-	-	1	2	2
				D413.6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).	-	-	-	-	2	-	-	2	2	3	1	1	2	2