REGULATION
2021

PRIST
DEEMED TO BE
UNIVERSITY
NAAC ACCREDITED
THANJAVUR- 613 403 - TAMIL NADU

INDEX

REGULATION – 2021

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SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

1.1.1. Relevance of Curriculum to Local, National, Regional, Global, Development Needs

COURSE OBJECTIVE R-(2021)

LOCAL NEEDS	
REGIONAL NEEDS	
NATIONAL NEEDS	
GLOBAL NEEDS	

LOCAL NEEDS REGIONAL NEEDS NATIONAL NEEDS GLOBAL NEEDS

Course code	Course name	Course outcomes
21147IP	Induction Programme	• Engineering colleges were established to train graduates well in the branch/department of admission, have a holistic outlook, and have a desire to work for national needs and beyond. The graduating student must have knowledge and skills in the area of his/her study. However, he/she must also have a broad understanding of society and relationships. Character needs to be nurtured as an essential quality by which he/she would understand and fulfill his/her responsibility as an engineer, a citizen and a human being. Besides the above, several meta-skills and underlying values are needed."
21147S11	Professional English - I	• To listen and comprehend complex academic texts • To read and infer the denotative and connotative meanings of technical texts • To write definitions, descriptions, narrations and essays on various topics • To speak fluently and accurately in formal and informal communicative contexts • To express their opinions effectively in both oral and written medium of communication
21148S12	Matrices and Calculus	• Use the matrix algebra methods for solving practical problems. • Apply differential calculus tools in solving various application problems. • Able to use differential calculus ideas on several variable functions. • Apply different methods of integration in solving practical problems. • Apply multiple integral ideas in solving areas, volumes and other practical problems.
21149S13	Engineering Physics	• Understand the importance of mechanics. • Express their knowledge in electromagnetic waves. • Demonstrate a strong foundational knowledge in oscillations, optics and lasers. • Understand the importance of quantum physics. • Comprehend and apply quantum mechanical principles towards the formation of energybands.
21149S14	Engineering Chemistry	• To infer the quality of water from quality parameter data and propose suitable treatmentmethodologies to treat water. • To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications. • To apply the knowledge of phase rule and composites for material selectionrequirements. • To recommend suitable fuels for engineering processes and

		applications. • To recognize different forms of energy resources and apply them for suitableapplications in energy sectors.
21150S15	Problem Solving and Python Programmi ng	• Develop algorithmic solutions to simple computational problems. • Develop and execute simple Python programs. • Write simple Python programs using conditionals and loops for solving problems. • Decompose a Python program into functions. • Represent compound data using Python lists, tuples, dictionaries etc. • Read and write data from/to files in Python programs.
21150L16	Problem Solving and Python Programmin g Laboratory	• Develop algorithmic solutions to simple computational problems • Develop and execute simple Python programs. • Implement programs in Python using conditionals and loops for solving problems. • Deploy functions to decompose a Python program. • Process compound data using Python data structures. • Utilize Python packages in developing software applications.
21149L17	Physics and Chemistry Laboratory	• Understand the functioning of various physics laboratory equipment. • Use graphical models to analyze laboratory data. • Use mathematical models as a medium for quantitative reasoning and describing physicalreality. • Access, process and analyze scientific information. • Solve problems individually and collaboratively. • To analyse the quality of water samples with respect to their acidity, alkalinity, hardnessand DO. • To determine the amount of metal ions through volumetric and spectroscopic techniques • To analyse and determine the composition of alloys. • To learn simple method of synthesis of nanoparticles • To quantitatively analyse the impurities in solution by electroanalytical techniques
21147L18	Communication Lab – I	• Speak effectively in group discussions held in formal/semi formal contexts. • Discuss, analyse and present concepts and problems from various perspectives to arrive atsuitable solutions • Write emails, letters and effective job applications. • Write critical reports to convey data and information with clarity and precision • Give appropriate instructions and recommendations for safe execution of tasks

21147S21	Professional English – II	• To compare and contrast products and ideas in technical texts. • To identify and report cause and effects in events, industrial processes through technical texts • To analyse problems in order to arrive at feasible solutions and communicate them in thewritten format. • To present their ideas and opinions in a planned and logical manner • To draft effective resumes in the context of job search.
21148S22	Statistics and Numerical Methods	• Apply the concept of testing of hypothesis for small and large samples in real life problems. • Apply the basic concepts of classifications of design of experiments in the field of engineering. • Appreciate the numerical techniques of interpolation in various intervals and apply thenumerical techniques of differentiation and integration for engineering problems. • Understand the knowledge of various techniques and methods for solving first and secondorder ordinary differential equations. • Solve the partial and ordinary differential equations with initial and boundary conditions byusing certain techniques with engineering applications.
21149S23B	Physics for Electronics Engineering	• know basics of crystallography and its importance for varied materials properties • gain knowledge on the electrical and magnetic properties of materials and their applications • understand clearly of semiconductor physics and functioning of semiconductor devices • understand the optical properties of materials and working principles of various optical devices • appreciate the importance of nanotechnology and nanodevices.
21154S24	Engineering Graphics	• Use BIS conventions and specifications for engineering drawing. • Construct the conic curves, involutes and cycloid. • Solve practical problems involving projection of lines. • Draw the orthographic, isometric and perspective projections of simple solids. • Draw the development of simple solids.
21153S25B	Electrical and Instrumentation Engineering	• Explain the working principle of electrical machines • Analyze the output characterizes of electrical machines • Choose the appropriate electrical machines for various applications • Explain the types and operating principles of measuring instruments • Explain the basic power system structure and protection schemes

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21153S26A	Circuit Analysis	• Apply the basic concepts of circuit analysis such as Kirchoff's laws, mesh current andnode voltage method for analysis of DC and AC circuits. • Apply suitable network theorems and analyze AC and DC circuits • Analyze steady state response of any R, L and C circuits • Analyze the transient response for any RC, RL and RLC circuits and frequency responseof parallel and series resonance circuits. • Analyze the coupled circuits and network topologies
21154L27	Engineering Practices Laboratory	• Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work. • Wire various electrical joints in common household electrical wire work. • Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work. • Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.
21153L28A	Circuits Analysis Laboratory	• Design RL and RC circuits. • Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems.
21147L29	Communication Lab – II	• Speak effectively in group discussions held in formal/semi formal contexts. • Discuss, analyse and present concepts and problems from various perspectives to arrive atsuitable solutions • Write emails, letters and effective job applications. • Write critical reports to convey data and information with clarity and precision • Give appropriate instructions and recommendations for safe execution of tasks
21148S31B	Random Processes and Linear Algebra	• Explain the fundamental concepts of advanced algebra and their role in modernmathematics and applied contexts. • Demonstrate accurate and efficient use of advanced algebraic techniques. • Apply the concept of random processes in engineering disciplines. • Understand the fundamental concepts of probability with a thorough knowledge of standard distributions that can describe certain real-life phenomenon. • Understand the basic concepts of one and two dimensional random variables and applythem to model engineering problems.
21152S32	Control Systems	▪ Compute the transfer function of different physical systems. ▪ Analyse the time domain specification and calculate the steady state error. ▪ Illustrate the frequency response characteristics of open loop and closed loop systemresponse. ▪ Analyse the stability using Routh and root locus techniques. ▪ Illustrate the state space model of a physical system and discuss the concepts of sampleddata control system.
21152S33	C Programming and Data Structures	• Develop C programs for any real world/technical application. • Apply advanced features of C in solving problems. • Write functions to implement linear and non–linear data structure operations.

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		• Suggest and use appropriate linear/non–linear data structure operations for solving a givenproblem. • Appropriately use sort and search algorithms for a given application. • Apply appropriate hash functions that result in a collision free scenario for data storage andretrieval.
21152C34	Digital Systems Design	▪ Use Boolean algebra and simplification procedures relevant to digital logic. ▪ Design various combinational digital circuits using logic gates. • Analyse and design synchronous sequential circuits. • Analyse and design asynchronous sequential circuits. • Build logic gates and use programmable devices
21152C35	Signals and Systems	▪ determine if a given system is linear/causal/stable • determine the frequency components present in a deterministic signal • characterize continuous LTI systems in the time domain and frequency domain • characterize discrete LTI systems in the time domain and frequency domain • compute the output of an LTI system in the time and frequency domains
21152C36	Electronic Devices and Circuits	• Explain the structure and working operation of basic electronic devices. • Design and analyze amplifiers. • Analyze frequency response of BJT and MOSFET amplifiers • Design and analyze feedback amplifiers and oscillator principles. • Design and analyze power amplifiers and supply circuits
21152L37	C Programming and Data Structures Lab	▪ Use different constructs of C and develop applications ▪ Write functions to implement linear and non-linear data structure • operations ▪ Suggest and use the appropriate linear / non-linear data structure operations for a givenproblem ▪ Apply appropriate hash functions that result in a collision free scenario for data storage andRetrieval ▪ Implement Sorting and searching algorithms for a given application
21152L38	Electronic Devices and Circuits Lab	• Characteristics of PN Junction Diode and Zener diode. • Design and Testing of BJT and MOSFET amplifiers. • Operation of power amplifiers.
21152L39	Professional Development	• Use MS Word to create quality documents, by structuring and organizing content for their dayto day technical and academic requirements • Use MS EXCEL to perform data operations and analytics, record, retrieve data as perrequirements and visualize data for ease of understanding • Use MS PowerPoint to create high quality academic presentations by including commontables, charts, graphs, interlinking other elements, and using media objects.
21152C41	Electromagnetic Fields	• Relate the fundamentals of vector, coordinate system to electromagnetic concepts • Analyze the characteristics of Electrostatic field • Interpret the concepts of Electric field in material space and solve the boundary conditions

		• Explain the concepts and characteristics of Magneto Static field in material space and solve boundary conditions. • Determine the significance of time varying fields
21152C42	Linear Integrated Circuits	• Design linear and nonlinear applications of OP – AMPS • Design applications using analog multiplier and PLL • Design ADC and DAC using OP – AMPS • Generate waveforms using OP – AMP Circuits • Analyze special function ICs
21152C43	Communication Systems	• Gain knowledge in amplitude modulation techniques • Understand the concepts of Random Process to the design of communication systems • Gain knowledge in digital techniques • Gain knowledge in sampling and quantization • Understand the importance of demodulation techniques
21152C44	Digital Signal Processing	• Apply DFT for the analysis of digital signals and systems • Design IIR and FIR filters • Characterize the effects of finite precision representation on digital filters • Design multirate filters • Apply adaptive filters appropriately in communication systems
21152C45	Networks and Security	• Explain the Network Models, layers and functions. • Categorize and classify the routing protocols. • List the functions of the transport and application layer. • Evaluate and choose the network security mechanisms. • Discuss the hardware security attacks and countermeasures.
21149S46	Environmental Sciences and Sustainability	• To recognize and understand the functions of environment, ecosystems and biodiversity andtheir conservation. • To identify the causes, effects of environmental pollution and natural disasters and contributeto the preventive measures in the society. • To identify and apply the understanding of renewable and non-renewable resources andcontribute to the sustainable measures to preserve them for future generations. • To recognize the different goals of sustainable development and apply them for suitabletechnological advancement and societal development. • To demonstrate the knowledge of sustainability practices and identify green materials, energycycles and the role of sustainable urbanization.
21152L47	Linear Integrated Circuits Laboratory	• Analyze various types of feedback amplifiers • Design oscillators, tuned amplifiers, wave-shaping circuits and multivibrators • Design and simulate feedback amplifiers, oscillators, tuned amplifiers, wave-shapingcircuits and multivibrators, filters using SPICE Tool. • Design amplifiers, oscillators, D-A converters using operational amplifiers. • Design filters using op-amp and perform an experiment on frequency response
21152L48	Communication Systems Laboratory	• Design AM, FM & Digital Modulators for specific applications. • Compute the sampling frequency for digital modulation. • Simulate & validate the various functional modules of Communication system. • Demonstrate their knowledge in base band signaling schemes through implementation of digital modulation schemes. • Apply various channel coding schemes & demonstrate their capabilities

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		towards theimprovement of the noise performance of Communication system.
21152C51	Wireless Communication	• Understand The Concept And Design Of A Cellular System. • Understand Mobile Radio Propagation And Various Digital Modulation Techniques. • Understand The Concepts Of Multiple Access Techniques And Wireless Networks • Characterize a wireless channel and evolve the system design specifications • Design a cellular system based on resource availability and traffic demands.
21152C52	VLSI and Chip Design	• In depth knowledge of MOS technology • Understand Combinational Logic Circuits and Design Principles • Understand Sequential Logic Circuits and Clocking Strategies • Understand Memory architecture and building blocks • Understand the ASIC Design Process and Testing.
21152C53	Transmission Lines and RF Systems	• Explain the characteristics of transmission lines and its losses. • Calculate the standing wave ratio and input impedance in high frequency transmission lines. • Analyze impedance matching by stubs using Smith Charts. • Comprehend the characteristics of TE and TM waves. • Design a RF transceiver system for wireless communication
21152E54A	Optical Communication Networks	• Realize Basic Elements In Optical Fibers, Different Modes And Configurations. • Analyze The Transmission Characteristics Associated With Dispersion And Polarization Techniques. • Design Optical Sources And Detectors With Their Use In Optical Communication System. • Construct Fiber Optic Receiver Systems, Measurements And Techniques. • Design Optical Communication Systems And Its Networks.
21152E54B	4G /5G Communication Networks	• To understand the evolution of wireless networks. • To learn the concepts of 5G networks. • To comprehend the 5G architecture and protocols. • To understand the dynamic spectrum management. • To learn the security aspects in 5G networks.
21152E54C	Avionics Systems	• Explain the different of Avionics Systems and its need for civil and military aircrafts considering the reliability and safety aspects • Select a suitable architecture and data bus based on the requirements • Compare the different display technologies used in cockpit • Explain the principles of flight control systems and the importance of FMS • Explain the communication and navigation techniques used in aircrafts
21152E55A	Software Defined Networks	• Describe the motivation behind SDN and its data plane (K2) • Identify the functions of control plane (K3) • Apply SDN to networking applications (K3) • Apply various operations of network function virtualization • Explain various use cases of SDN
21152E55B	Image Processing	• Know and understand the basics and fundamentals of digital image processing, such as digitization, sampling, quantization, and 2D-transforms. • Operate on images using the techniques of smoothing, sharpening and enhancement. • Understand the restoration concepts and filtering techniques. • Learn the basics of segmentation, features extraction, compression and recognition methods for color models. • Comprehend image compression concepts.
21152E55C	Speech	• Understand the fundamentals of speech.

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	Processing	• Extract various speech features for speech related applications • Choose an appropriate speech coder for a given application. • Build a speech enhancement system. • Build a text-to-speech synthesis system for various applications
21152E56A	DSP Architecture and Programming	**CO1**: Understand the architectural features of DSP Processors. **CO2**: Comprehend the organization of TMS320C54xx DSP processors **CO3**: Build solutions using TMS320C6x DSP Processor **CO4**: Implement DSP Algorithms **CO5**: Study the applications of DSP Processors. Study the architecture of programmable DSP processors
21152E56B	Wireless Sensor Network Design	**CO1**: To be able to design solutions for WSNs applications **CO2**: To be able to develop efficient MAC and Routing Protocols **CO3**: To be able to design solutions for 6LOWPAN applications **CO4**: To be able to develop efficient layered protocols in 6LOWPAN **CO5**: To be able to use Tiny OS and Contiki OS in WSNs and 6LOWPAN applications
21152E56C	Computer Vision	**CO1**: Apply Convolution Neural Network for image processing. **CO2**: Understand the basics of associative memory and unsupervised learning networks. **CO3**: Apply CNN and its variants for suitable applications. **CO4**: Analyze the key computations underlying deep learning and use them to build and train deep neural networks for various tasks. **CO5**: Apply autoencoders and generative models for suitable applications.
21147MC51A	Introduction to Women and Gender Studies	**CO1**:Learn the importance of different components of health **CO2**:Gain confidence to lead a healthy life **CO3**:Learn new techniques to prevent lifestyle health disorders **CO4**:Understand the importance of diet and workouts in maintaining health
21147MC51B	Disaster Management	**CO1:** To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR) **CO2:** To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction **CO3:** To develop disaster response skills by adopting relevant tools and technology **CO4:** Enhance awareness of institutional processes for Disaster response in the country and • **CO5:** Develop rudimentary ability to respond to their surroundings with potential
21147MC51C	Film Appreciation	• The students will get an understanding of how societies are shaped by philosophy, political and economic system, how they relate to fulfilling human goals & desires with some case studies of how different attempts have been made in the past and how

		they have fared. • A Reader containing important articles on films will be prepared and given to the students. The students must read them and present in the class and have discussion on these.
21147MC51D	Elements of Literature	Students will be able to understand the relevance of literature in human life and appreciate its aspects in developing finer sensibilities
21152S61	Embedded Systems and IOT Design	**CO1**: Explain the architecture and features of 8051. **CO2**: Develop a model of an embedded system. **CO3**: List the concepts of real time operating systems. **CO4**: Learn the architecture and protocols of IoT. **CO5**: Design an IoT based system for any application
21152S62	Artificial Intelligence and Machine Learning	**CO1**: Use appropriate search algorithms for problem solving **CO2**: Apply reasoning under uncertainty **CO3**: Build supervised learning models **CO4**: Build ensembling and unsupervised models **CO5**: Build deep learning neural network models
21152P81	Project Work	CO1: Formulate and analyze problem / create a new product/ process. CO2: Design and conduct experiments to find solution CO3: Analyze the results and provide solution for the identified problem, prepare project report and make presentation

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School: ENGINEERINGAND TECHNOLOGY

Dept: ECE- BTech (FT)

Mapping of COs and Pos

Regulation-2021

Sem	Subject code	Subject name	COS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
I-SEM	21147S11	Professional English - I	CO1:To use appropriate words in a professional context	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
			CO2:To gain understanding of basic grammatic structures and use them in right context.	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
			CO3:To read and infer the denotative and connotative meanings of technical texts	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
			CO4:To write definitions, descriptions, narrations and essays on various topics	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
			AVG	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-
	21148S12	Matrices and Calculus	CO1:Use the matrix algebra methods for solving practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
			CO2:Apply differential calculus tools in solving various application problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
			CO3:Able to use differential calculus ideas on several variable functions.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
			CO4:Apply different methods of integration in solving practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
			CO5:Apply multiple integral ideas in solving areas, volumes and other practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
			AVG	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
	21149S13	Engineering Physics	CO1:Understand the importance of mechanics.	3	3	2	1	1	1	-	-	-	-	-	-	-	-	-
			CO2:Express their knowledge in electromagnetic waves.	3	3	2	1	2	1	-	-	-	-	-	-	-	-	-
			CO3:Demonstrate a strong foundational knowledge in oscillations, optics and lasers.	3	3	2	2	2	1	-	-	-	-	-	1	-	-	-
			CO4:Understand the importance of quantum physics.	3	3	1	1	2	1	-	-	-	-	-	-	-	-	
			CO5:Comprehend and apply quantum mechanical principles towards the formation of energy bands.	3	3	1	1	2	1	-	-	-	-	-	-	-	-	-
			AVG	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-
	21149S14	Engineering Chemistry	CO1:To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	3	2	2	1	-	1	1	-	-	-	-	1	-	-	-
			CO2:To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.	2	-	-	1	-	2	2	-	-	-	-	-	-	-	-
			CO3:To apply the knowledge of phase rule and composites for material selection requirements.	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO4:To recommend suitable fuels for engineering processes and applications.	3	1	1	-	-	1	2	-	-	-	-	-	-	-	-
			CO5:To recognize different forms of energy resources and apply them for suitable applications in energy sectors	3	1	2	1	-	2	2	-	-	-	-	2	-	-	-
			AVG	2.8	1.3	1.6	1	-	1.5	1.8	-		-	-	1.5	-	-	-
	21150S15	Problem Solving and Python Programming	CO1: Develop algorithmic solutions to simple computational problems.	3	3	3	3	2	-	-	-	-	-	2	2	3	3	
			CO2: Develop and execute simple Python programs.	3	3	3	3	2	-	-	-	-	-	2	2	3	-	
			CO3: Write simple Python programs using conditionals and loops for solving problems.	3	3	3	3	2	-	-	-	-	-	2	-	3	-	
			CO4: Decompose a Python program into functions.	2	2	-	2	2	-	-	-	-	-	1	-	3	-	
			CO5: Represent compound data using Python lists, tuples, dictionaries etc.	1	2	-	-	1	-	-	-	-	-	1	-	2	-	
			CO6: Read and write data from/to files in Python programs	2	2	-	-	2	-	-	-	-	-	1	-	2	-	
			AVG	**2**	**3**	**3**	**3**	**2**	-	-	-	-	-	**2**	**2**	**3**	**3**	
	21150L16	Problem Solving and Python Programming Laboratory	CO1: Develop algorithmic solutions to simple computational problems	3	3	3	3	3	-	-	-	-	-	3	2	3	3	
			CO2: Develop and execute simple Python programs.	3	3	3	3	3	-	-	-	-	-	3	2	3	-	
			CO3: Implement programs in Python using conditionals and loops for solving problems..	3	3	3	3	2	-	-	-	-	-	2	-	3	-	
			CO4: Deploy functions to decompose a Python program.	3	2	-	2	2	-	-	-	-	-	1	-	3	-	
			CO5: Process compound data using Python data structures.	1	2	-	-	1	-	-	-	-	-	1	-	2	-	
			CO6: Utilize Python packages in developing software applications.	2	-	-	-	2	-	-	-	-	-	1	-	2	-	
			AVG	**2**	**3**	**3**	**3**	**2**	-	-	-	-	-	**2**	**2**	**3**	**3**	

	21149L17	Physics and Chemistry Laboratory	CO1:Understand the functioning of various physics laboratory equipment.	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
			CO2:Use graphical models to analyze laboratory data.	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
			CO3:Use mathematical models as a medium for quantitative reasoning and describing physical reality.	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
			CO4:Access, process and analyze scientific information.	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
			CO5:Solve problems individually and collaboratively.	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
			AVG	3	2.4	2.6	1	1										
	21147L18	Communication Lab – I	CO1:To listen to and comprehend general as well as complex academic information	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
			CO2:To listen to and understand different points of view in a discussion	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
			CO3:To speak fluently and accurately in formal and informal communicative contexts	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
			CO4:To describe products and processes and explain their uses and purposes clearly and accurately	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
			CO5:To express their opinions effectively in both formal and informal discussions	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
			AVG	**3**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
	21147S21	Professional English – II	CO1:To compare and contrast products and ideas in technical texts.	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
			CO2:To identify and report cause and effects in events, industrial processes through technical texts	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
			CO3:To analyse problems in order to arrive at feasible solutions and communicate them in the written format	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
			CO4:To present their ideas and opinions in a planned and logical manner	3	3	3	3	2	3	3	3	2	3	3	3	-	-	-
			CO5:To draft effective resumes in the context of job search.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
			AVG	**3**	**3**	**3**	**3**	**2.75**	**3**	**3**	**3**	**2.2**	**3**	**3**	**3**	**-**	**-**	**-**
	21148S22	Statistics and Numerical Methods	CO1:Apply the concept of testing of hypothesis for small and large samples in real life problems.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
			CO2:Apply the basic concepts of classifications of design of experiments in the field of agriculture.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
			CO3:Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
			CO4:Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
			CO5:Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
			AVG	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
	21149S23B	Physics for Electronics Engineering	CO1:know basics of crystallography and its importance for varied materials properties	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-
			CO2:gain knowledge on the electrical and magnetic properties of materials and their applications	3	2	1	2	-	2	-	-	-	-	-	-	-	-	-
			CO3:understand clearly of semiconductor physics and functioning of semiconductor devices	3	2	2	-	2	-	-	-	-	-	-	-	-	-	-
			CO4:understand the optical properties of materials and working principles of various optical devices	3	-	1	-	3	2	3	-	-	-	-	1	-	-	-
			CO5:appreciate the importance of nanotechnology and nanodevices	3	-	2	1	-	2	-	-	-	-	-	1	-	-	-
			AVG	3	2	1.4	1.5	2.5	2	3					1			
	21154S24	Engineering Graphics	CO1:Use BIS conventions and specifications for engineering drawing.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
			CO2:Construct the conic curves, involutes and cycloid.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
			CO3:Solve practical problems involving projection of lines.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
			CO4:Draw the orthographic, isometric and perspective projections of simple solids.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
			CO5:Draw the development of simple solids	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
			AVG	**3**	**1**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**3**	**-**	**2**	**2**	**2**	**-**
II - Sem	21153S25B	Electrical and Instrumentation Engineering	CO1:Use BIS conventions and specifications for engineering drawing.															
			CO2:Construct the conic curves, involutes and cycloid.															
			CO3:Solve practical problems involving projection of lines.															
			CO4:Draw the orthographic, isometric and perspective projections of simple solids.															
			CO5:Draw the development of simple solids															
			AVG															
	21153S26A	Circuit Analysis	CO1: Apply the basic concepts of circuit analysis such as Kirchoff's laws, mesh current and node voltage method for analysis of DC and AC circuits.	3	2	1	1	-	-	-	1		1	-	-	-	-	-
			CO2: Apply suitable network theorems and analyze AC and DC circuits	3	3	2	2	-	-	-	1		1	-	-	-	-	-
			CO3: Analyze steady state response of any R, L and C circuits	3	3	3	3	-	-	-	1		1	-	-	-	-	-

			CO4: Analyze the transient response for any RC, RL and RLC circuits and frequency response of parallel and series resonance circuits.	3	3	3	3	-	-	-	1		1	-	-	-	-	-
			CO5: Analyze the coupled circuits and network topologies	3	3	3	2	-	-	-	1		1	-	-	-	-	-
			AVG	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**1**		**1**	**-**	**-**	**-**	**-**	**-**
	21154L27	Engineering Practices Laboratory	CO1:Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
			CO2:Wire various electrical joints in common household electrical wire work.	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
			CO3:Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
			CO4:Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
			AVG															
	21153L28A	Circuits Analysis Laboratory	Design RL and RC circuits.	3	2	1	1	-	-	-	1	-	1	-	-	-	-	-
			Verify Thevinin & Norton theorem KVL & KCL, and Super Position Theorems	3	3	2	2	-	-	-	1	-	1	-	-	-	-	-
			To gain hands- on experience in Thevenin & Norton theorem, KVL & KCL, and Superposition Theorems.	3	3	3	3	-	-	-	1	-	1	-	-	-	-	-
			To understand the working of RL,RC and RLC circuits	3	3	3	3	-	-	-	1	-	1	-	-	-	-	-
			AVG	3	3	3	2	-	-	-	1	-	1	-	-	-	-	-
	21147L29	Communication Lab – II	CO1:Speak effectively in group discussions held in formal/semi formal contexts.	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
			CO2:Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
			CO3:Write emails, letters and effective job applications.	2	2	3	3	1	3	3	3	3	3	3	3	-	-	-
			CO4:Write critical reports to convey data and information with clarity and precision	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
			CO5:Give appropriate instructions and recommendations for safe execution of tasks	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
			AVG	2.4	2.8	3	3	1.8	3	3	3	3	3	3	3	-	-	-
	21148S31B	Random Processes and Linear Algebra	CO1:Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts.	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
			CO2:Demonstrate accurate and efficient use of advanced algebraic techniques.	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
			CO3:Apply the concept of random processes in engineering disciplines.	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
			CO4:Understand the fundamental concepts of probability with a thorough knowledge of standard distributions that can describe certain real-life phenomenon.	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
			CO5: Understand the basic concepts of one and two dimensional random variables and	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
			AVG	3	3	0	0	0	0	0	0	3	0	0	2	-	-	-
	21152S32	Control Systems	CO1: Compute the transfer function of different physical systems.	3	3	3	2	2	2	-	-	-	-	2	3	3	3	3
			CO2: Analyse the time domain specification and calculate the steady state error.	3	3	3	3	2	3	-	-	-	-	2	2	3	3	3
			CO3: Illustrate the frequency response characteristics of open loop and closed loop system response.	3	2	3	3	2	2	-	-	-	-	2	3	3	2	3
			CO4: Analyse the stability using Routh and root locus techniques.	3	3	3	2	2	2	-	-	-	-	2	2	3	3	3
			CO5: Illustrate the state space model of a physical system and discuss the concepts of sampled data control system	2	2	3	3	2	3	-	-	-	-	2	3	2	2	3
			AVG	3	3	3	3	2	2	-	-	-	-	2	3	3	3	3
	21152S33	C Programming and Data Structures	CO1:Develop C programs for any real world/technical application.	2	3	1	2	2	1	1	-	1	2	1	3	2	1	3
			CO2:Apply advanced features of C in solving problems.	1	2	1	2	2	-	-	-	1	1	1	2	2	2	2
			CO3:Write functions to implement linear and non–linear data structure operations.	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
			CO4:Suggest and use appropriate linear/non–linear data structure operations for solving a given problem.	1	2	1	2	2	1	1	-	1	2	1	3	2	2	3
			CO5:Appropriately use sort and search algorithms for a given application.	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2
			CO6:Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2
			AVG	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2
	21152C34	*Digital Systems Design*	CO1: Use Boolean algebra and simplification procedures relevant to digital logic.	3	2	2	2	-	2	-	-	-	-	3	3	3	3	2
			CO2: Design various combinational digital circuits using logic gates.	-	-	-	-	-	-	-	-	-	-	2	1	2	3	2
			CO3:Analyse and design synchronous sequential circuits.	-	3	3	2	-	2	-	-	-	-	2	2	3	3	2

			CO4: Analyse and design asynchronous sequential circuits. .	-	-	-	-	-	-	-	-	-	-	3	2	2	3	1
			CO5: Build logic gates and use programmable devices	-	3	3	3	-	-	-	-	-	-	2	2	3	3	2
			AVG	3	2.6	2.6	2.3	-	2	-	-	-	-	2	2	3	3	2
III - Sem		Signals and Systems	CO1:determine if a given system is linear/causal/stable	3	-	3	-	3	2	-	-	-	-	-	3	-	-	1
			CO2: determine the frequency components present in a deterministic signal .	3	-	3	-	-	2	-	-	-	-	-	3	-	3	-
	21152C35		CO3:characterize continuous LTI systems in the time domain and frequency domain	3	3	-	-	3	2	-	-	-	-	-	3	2	-	-
			CO4:characterize discrete LTI systems in the time domain and frequency domain	3	3	-	-	3	2	-	-	-	-	-	3	-	3	1
			CO5:compute the output of an LTI system in the time and frequency domains	3	3	-	3	3	2	-	-	-	-	-	3	-	3	1
			AVG	3	3	3	3	3	2	-	-	-	-	-	3	2	3	1
		Electronic Devices and Circuits	CO1: Explain the structure and working operation of basic electronic devices.	3	3	3	3	2	1	-	-	-	-	-	1	2	1	1
			CO2: Design and analyze amplifiers.	3	2	2	3	2	2	-	-	-	-	-	1	2	1	1
	21152C36		CO3: Analyze frequency response of BJT and MOSFET amplifiers	3	3	3	2	1	2	-	-	-	-	-	1	2	1	1
			CO4: Design and analyze feedback amplifiers and oscillator principles.	3	3	2	3	2	2	-	-	-	-	-	1	2	1	1
			CO5: Design and analyze power amplifiers and supply circuits	3	2	3	2	2	1	-	-	-	-	-	1	2	1	1
			AVG	3	3	3	3	2	2	-	-	-	-	-	1	2	1	1
		C Programming and Data Structures Lab	CO1:Use different constructs of C and develop applications	2	3	1	2	2	1	1	-	1	2	1	3	2	1	3
			CO2:Write functions to implement linear and non-linear data structure operations	1	2	1	2	2	-	-	-	1	1	1	2	2	2	2
	21152L37		CO3:Suggest and use the appropriate linear / non-linear data structure operations for a given problem	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
			CO4:Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
			CO5:Implement Sorting and searching algorithms for a given application	1	2	1	2	2	1	1	-	1	2	1	3	2	2	3
			AVG	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2
		Electronic Devices and Circuits Lab	CO1:Characteristics of PN Junction Diode and Zener diode.	2	2	3	3	2	1	-	-	-	-	-	1	2	1	1
			CO2:Design and Testing of BJT and MOSFET amplifiers.	2	2	3	3	2	1	-	-	-	-	-	1	2	1	1
	21152L38		CO3:Operation of power amplifiers.	2		2		1	1	-	-	-	-	-	1	2	1	1
			CO4: Design and analyze feedback amplifiers and oscillator principles.	-	-	-	-	3	1	-	-	-	-	-	1	2	1	1
			CO5: Design and analyze power amplifiers and supply circuits	-	-	-	-	2	1	-	-	-	-	-	1	2	1	1
			AVG	2	2	2.6	3	2	1	-	-	-	-	-	1	2	1	1
		Professional Development	CO1:Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	21152L39		CO2:Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
			CO3:Use MS PowerPoint to create high quality academic presentations by including common tables, charts, graphs, interlinking other elements, and using media objects	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		Electromagnetic Fields	CO1: Relate the fundamentals of vector, coordinate system to electromagnetic concepts	2	1	1	1	-	2	1	-	-	1	-	2	-	-	-
			CO2: Analyze the characteristics of Electrostatic field	2	2	3	3	2	2	2	-	-	1	1	2	-	-	-
	21152C41		CO3: Interpret the concepts of Electric field in material space and solve the boundary conditions	2	2	3	2	2	2	1	-	-	1	1	2	-	-	-
			CO4: Explain the concepts and characteristics of Magneto Static field in material space and solve boundary conditions	2	2	3	2	2	2	1	-	-	1	1	2	-	-	-
			CO5: Determine the significance of time varying fields	2	2	2	2	2	2	1	-	-	2	2	1	-	-	-
			AVG	2	2	2	2	2	2	1	-	-	1	1	2	-	-	-
		Linear Integrated Circuits	CO1 : Design linear and nonlinear applications of OP – AMPS	2	-	-	-	-	-	-	-	-	-	1	-	2	1	1
			CO2 : Design applications using analog multiplier and PLL	2	3	3	2	-	-	-	-	-	-	-	-	2	1	1
	21152C42		CO3 : Design ADC and DAC using OP – AMPS	1	-	-	2	-		-	-	-	-	-	-	2	1	1
			CO4 : Generate waveforms using OP – AMP Circuits	1	-	-	2	-	-	-	-	-	-	-	-	2	1	1
			CO5 : Analyze special function ICs	1	2	3	3	-	-	-	-	-	-	-	3	2	1	1
			AVG	1.4	2.5	3	2.2	-	-	-	-	-	-	1	3	2	1	1
		Communication Systems	CO1: Gain knowledge in amplitude modulation techniques	3	3	3	3	2	1	1	-	-	-	1	1	-	-	-
			CO2: Understand the concepts of Random Process to the design of communication systems	3	3	3	3	2	1	1	-	-	-	1	1	-	-	-
	21152C43		CO3: Gain knowledge in digital techniques	3	3	3	3	3	1	1	-	-	-	1	1	-	-	-
			CO4: Gain knowledge in sampling and quantization	3	3	3	3	3	1	1	-	-	-	1	1	-	-	-
			CO5: Understand the importance of demodulation techniques	3	3	3	3	2	1	1	-	-	-	1	1	-	-	-
			AVG	3	3	3	3	2.5	1	1	-	-	-	1	1	-	-	-
		Digital Signal Processing	CO1:Apply DFT for the analysis of digital signals and systems	3	3	3	3	2	2	-	-	-	-	1	1	3	3	2
			CO2:Design IIR and FIR filters	3	3	3	3	2	2	-	-	-	-	1	1	2	2	2

	21152C44		CO3: Characterize the effects of finite precision representation on digital filters	3	3	2	2	2	2	-	-	-	-	1	1	1	2	2
			CO4:Design multirate filters	3	3	2	2	3	1	-	-	-	-	1	1	2	2	3
			CO5:Apply adaptive filters appropriately in communication systems	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
			AVG	3	3	2	2	2	2	-	-	-	-	1	1	2	2	2
IV - Sem		*Networks and Security*	CO1: Explain the Network Models, layers and functions.	3	3	3	3	2	2	-	-	-	-	1	1	3	3	2
			CO2: Categorize and classify the routing protocols.	3	3	3	3	2	2	-	-	-	-	1	1	2	2	2
	21152C45		CO3: List the functions of the transport and application layer.	3	3	2	2	2	2	-	-	-	-	1	1	1	2	2
			CO4: Evaluate and choose the network security mechanisms.	3	3	2	2	3	1	-	-	-	-	1	1	2	2	3
			CO5: Discuss the hardware security attacks and countermeasures.	3	2	2	2	3	2	-	-	-	-	1	1	2	2	1
			AVG	3	3	2	2	2	2	-	-	-	-	1	1	2	2	2
		Environmental Sciences and Sustainability	CO1:To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
			CO2:To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
	21149S46		CO3:To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
			CO4:To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
			CO5:To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
			AVG	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-
		Linear Integrated Circuits Laboratory	CO1 : Design linear and nonlinear applications of OP – AMPS	2	-	-	-	-	-	-	-	-	-	1	-	2	1	1
			CO2 : Design applications using analog multiplier and PLL	2	3	3	2	-	-	-	-	-	-	-	-	2	1	1
	21152L47		CO3 : Design ADC and DAC using OP – AMPS	1	-	-	2	-		-	-	-	-	-	-	2	1	1
			CO4 : Generate waveforms using OP – AMP Circuits	1	-	-	2	-	-	-	-	-	-	-	-	2	1	1
			CO5 : Analyze special function ICs	1	2	3	3	-	-	-	-	-	-	-	3	2	1	1
			AVG	1.4	2.5	3	2.2	-	-	-	-	-	-	1	3	2	1	1
		Communication Systems Laboratory	CO1: Gain knowledge in amplitude modulation techniques	3	3	3	3	3	3	-	-	-	1	1	1	-	-	-
			CO2: Understand the concepts of Random Process to the design of communication systems	3	3	3	3	3	2	-	-	-	1	1	1	-	-	-
	21152L48		CO3: Gain knowledge in digital techniques	3	3	3	3	3	2	-	-	-	1	1	1	-	-	-
			CO4: Gain knowledge in sampling and quantization	3	3	3	3	3	3	-	-	-	1	1	1	-	-	-
			CO5: Understand the importance of demodulation techniques	3	3	3	3	3	2	-	-	-	1	1	1	-	-	-
			AVG	3	3	3	3	3	2.5	-	-	-	1	1	1	-	-	-
		*Wireless Communication *	CO1:Understand The Concept And Design Of A Cellular System.	3	2	2	3	3	1	-	-	-	-	-	1	3	1	1
			CO2:Understand Mobile Radio Propagation And Various Digital Modulation Techniques.	3	3	2	1	3	2	-	-	-	-	-	-	3	1	2
	21152C51		CO3:Understand The Concepts Of Multiple Access Techniques And Wireless Networks .	3	3	3	3	2	2	-	-	-	-	-	1	3	1	2
			CO4:Characterize a wireless channel and evolve the system design specifications	2	3	2	2	2	2	-	-	-	-	-	1	2	1	1
			CO5:Design a cellular system based on resource availability and traffic demands.	2	-	3	3	2	1	-	-	-	-	-	1	2	2	2
			AVG	3	3	2	2	2	2	-	-	-	-	-	1	3	1	2
		VLSI and Chip Design	CO1: In depth knowledge of MOS technology	1	1	-	-	-	-	-	-	-	-	-	-	3	3	3
			CO2: Understand Combinational Logic Circuits and Design Principles .	3	2	3	2	-	-	-	-	-	-	-	1	3	3	3
	21152C52		CO3: Understand Sequential Logic Circuits and Clocking Strategies	2	3	2	3	1	1	-	-	-	-	-	2	3	2	3
			CO4: Understand Memory architecture and building blocks	-	-	1	1	-	-	-	-	-	-	-	3	3	3	2
V - sem			CO5: Understand the ASIC Design Process and Testing.	-	-	-	-	-	2	-	-	-	-	1	-	3	2	2
			AVG	2	2	2	2	1	1.5	-	-	-	-	1	2	3	3	3
		Transmission Lines and RF Systems	CO1: Explain the characteristics of transmission lines and its losses.	3	3	3	3	2	1	-	-	-	1	-	1	2	1	1
			CO2: Calculate the standing wave ratio and input impedance in high frequency transmission lines.	3	2	2	3	2	1	-	-	-	1	-	1	2	1	1
	21152C53		CO3: Analyze impedance matching by stubs using Smith Charts.	3	3	3	2	1	2	-	-	-	1	-	1	2	1	1
			CO4: Comprehend the characteristics of TE and TM waves.	3	3	2	3	2	1	-	-	-	1	-	1	2	1	1
			CO5: Design a RF transceiver system for wireless communication	3	2	3	2	2	1	-	-	-	1	-	1	2	1	1
			AVG	3	3	3	3	2	1	-	-	-	1	-	1	2	1	1
		VLSI Laboratory	CO1: Write HDL code for basic as well as advanced digital integrated circuit	2	-	-	-	-	-	-	-	-	-	-	-	2	3	2
			CO2: Import the logic modules into FPGA Boards	3	3	1	1	-	-	-	-	-	-	-	-	2	1	2
	21152L58		CO3: Synthesize Place and Route the digital Ips	1	2	2	2	-	-	-	-	-	-	1	1	2	2	2
			CO4: Design, Simulate and Extract the layouts of Digital & Analog IC Blocks using EDA tools	-	1	3	3	1	-	-	-	-	-	1	1	2	2	2
			CO5: Test and Verification of IC design	3	3	3	3	1	-	-	-	-	-	1	1	2	2	2
			AVG	2.2	2.2	2.2	2.2	1	-	-	-	-	-	1	1	2	2	2
		*Embedded Systems	CO1: Explain the architecture and features of 8051.	3	3	3	2	2	-	-	-	-	-	-	-	3	2	1

	21152S61	and IOT Design*	CO2: Develop a model of an embedded system.	3	3	3	2	2	-	-	-	-	-	-	-	3	2	1
			CO3: List the concepts of real time operating systems.	3	3	2	2	2	-	-	-	-	-	-	-	2	1	1
			CO4: Learn the architecture and protocols of IoT.	3	3	2	2	2	-	-	-	-	-	-	-	3	3	2
			CO5: Design an IoT based system for any application.	3	3	3	3	3	-	-	-	-	-	-	-	3	3	2
VI - sem			AVG	3	3	2.6	2.2	2.2	-	-	-	-	-	-	-	2.8	2.2	1.4
	21152S62	*Artificial Intelligence and Machine Learning*	CO1: Use appropriate search algorithms for problem solving	3	2	2	3	1	3	2	-	-	-	-	1	3	3	3
			CO2: Apply reasoning under uncertainty	3	2	2	3	1	3	2	-	-	-	-	1	3	3	3
			CO3: Build supervised learning models	1	2	1	3	2	3	2	-	-	-	-	1	3	3	3
			CO4: Build ensembling and unsupervised models	1	2	3	1	3	3	2	-	-	-	-	1	3	3	3
			CO5: Build deep learning neural network models	2	2	2	-	3	3	2	-	-	-	-	1	3	3	3
			AVG	2	2	2	2	2	3	2	-	-	-	-	1	3	3	3
	211 _S71	Human Values and Ethics	CO1 : Identify the importance of democratic, secular and scientific values in harmonious functioning of social life	3	2	2	3	2	1	-	-	-	1	-	1	2	1	1
			CO2 : Practice democratic and scientific values in both their personal and professional life.	3	3	3	2	1	2	-	-	-	1	-	1	2	1	1
			CO3 : Find rational solutions to social problems.	3	3	2	3	2	1	-	-	-	1	-	1	2	1	1
			CO4 : Behave in an ethical manner in society	3	2	3	2	2	1	-	-	-	1	-	1	2	1	1
			CO5 : Practice critical thinking and the pursuit of truth.	3	3	3	3	2	1	-	-	-	1	-	1	2	1	1
			AVG	2	-	-	-	-	-	-	-	-	-	-	-	2	3	2
VII - sem	21152INT76	Summer Internship	CO1:System-level design processes, verification and validation techniques, manufacturing and production processes in the firm or research facilities in the laboratory/research institute	1	1	-	-	-	-	-	-	-	-	-	-	3	3	3
			CO2: Analysis of industrial / research problems and their solutions	3	2	3	2	-	-	-	-	-	-	-	1	3	3	3
			CO3: Documentation of system specifications, design methodologies, process parameters, testing parameters and results	2	3	2	3	1	1	-	-	-	-	-	2	3	2	3
				-	-	1	1	-	-	-	-	-	-	-	3	3	3	2
			CO4: Preparing of technical report and presentation	-	-	-	-	-	2	-	-	-	-	1	-	3	2	2
			AVG	2	2	2	2	1	1.5	-	-	-	-	1	2	3	3	3
	21152P81	Project Work	CO1: Formulate and analyze problem / create a new product/ process.	3	2	2	3	1	3	2	-	-	-	-	1	3	3	3
			CO2: Design and conduct experiments to find solution	3	2	2	3	1	3	2	-	-	-	-	1	3	3	3
VIII- Se,			CO3: Analyze the results and provide solution for the identified problem, prepare project report and make presentation.	1	2	1	3	2	3	2	-	-	-	-	1	3	3	3
			AVG	2	-	-	-	-	-	-	-	-	-	-	-	2	3	2
	21152E54A	Optical Communication Networks	CO1:Realize Basic Elements In Optical Fibers, Different Modes And Configurations.	3	3	2	3	3	1	-	-	-	-	-	1	2	1	2
			CO2:Analyze The Transmission Characteristics Associated With Dispersion And Polarization Techniques.	3	3	2	1	3	2	-	-	-	-	-	2	2	2	2
			CO3:Design Optical Sources And Detectors With Their Use In Optical Communication System.	3	3	3	3	2	1	-	-	-	-	-	1	2	2	2
			CO4:Construct Fiber Optic Receiver Systems, Measurements And Techniques.	3	3	2	2	2	1	-	-	-	-	-	1	2	1	2
			CO5:Design Optical Communication Systems And Its Networks.	3	3	3	3	2	1	-	-	-	-	-	1	2	2	2
			AVG	3	3	2	3	3	1	-	-	-	-	-	1	2	1	2
	21152E54B	4G /5G Communication Networks	CO1:To understand the evolution of wireless networks.	3	3	2	3	2	-	-	-	-	-	-	-	1	1	3
			CO2:To learn the concepts of 5G networks.	3	3	3	2	2	-	-	-	-	-	-	-	1	1	2
			CO3:To comprehend the 5G architecture and protocols.	3	3	2	2	2	-	-	-	-	-	-		2	2	2
			CO4:To understand the dynamic spectrum management.	3	3	3	3	2	-	-	-	-	-	-	-	3	2	2
			CO5:To learn the security aspects in 5G networks	3	2	3	3	2	-	-	-	-	-	-	-	2	2	2
			AVG	3	2.8	2.6	2.6	2	-	-	-	-	-	-	-	1.8	1.6	2.2
	21152E55A	Software Defined Networks	CO1: Describe the motivation behind SDN and its data plane (K2)	3	3	3	3	3	2	-	-	-	-	-	3	3	3	2
			CO2: Identify the functions of control plane (K3)	3	3	3	2	2	2	-	-	-	-	-	3	3	2	2
			CO3: Apply SDN to networking applications (K3)	3	3	3	3	1	2	-	-	-	-	-	3	2	3	2
			CO4: Apply various operations of network function virtualization	2	3	3	2	2	1	-	-	-	-	-	2	2	1	2
			CO5: Explain various use cases of SDN	3	3	2	2	2	1	-	-	-	-	-	2	2	2	2
			AVG	3	3	3	2	2	2	-	-	-	-	-	2	2	2	2
	21152E64C	Massive MIMO Networks	CO1: Understand and explain massive MIMO networks.	3	2	1	1	2	2	-	-	-	-	-	2	3	1	2
			CO2: Analyze massive MIMO propagation channels and their capacity bounds	3	3	2	2	2	2	-	-	-	-	-	1	2	2	1
			CO3: Examine channel estimation techniques for single cell system.	3	2	2	2	2	2	-	-	-	-	-	1	3	3	2
			CO4: Analyze channel estimation techniques for multi cell system.	3	3	2	2	2	2	-	-	-	-	-	1	3	1	3
			CO5: Explain the concepts underlining the deployment of single and multicell massive MIMO systems.	3	2	2	2	2	2	-	-	-	-	-	2	3	3	2
			AVG	3	2.4	1.8	1.8	2	2	-	-	-	-	-	1.4	3	2	2
		Advanced Wireless Communication Techniques	CO1: The student would be able to appreciate the necessity and the design aspects of cooperative communication	3	3	3	2	1	1	-	-	-	-	-	2	3	3	3
			CO2: The student would be able to appreciate the necessity and the design aspects of green wireless communication.	3	3	3	2	2	1	-	-	-	-	-	2	3	2	3

	21152E65A		CO3: The student would be able to evolve new techniques in wireless communication	3	2	2	1	2	1	-	-	-	-	-	2	2	1	1
			CO4: The students would be able to demonstrate the feasibility of using mathematical models using simulation tools.	3	3	3	3	2	1	-	-	-	-	-	2	3	1	2
			CO5: The student would be able to demonstrate the impact of the green engineering solutions in a global, economic, environmental and societal context.	3	3	3	2	1	2	-	-	-	-	-	2	2	3	1
			AVG	3	2.8	2.8	2	1.6	1.2	-	-	-	-	-	2	3	2	2
	21160S72A	Principles of Management	CO1: Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling.	3		-	-	-	1	-	-	-	-	-	-	2	1	1
			CO2: Have same basic knowledge on international aspect of management.	-	1	1	-	-	-	-	-	-	-	-	-	2	1	-
			CO3: Ability to understand management concept of organizing.	1		-	2	-	-	1	-	2	-	1	1	-	-	2
			CO5: Ability to understand management concept of CONTROLLING	-	1	1	1	2	-	-	1	2	-	-	-	1	1	1
			CO4: Ability to understand management concept of directing.	1		-	-	1	1	-	-	-	3	-	1	1	-	1
			AVG	1.66	1	1	1.5	1.5	1	1	1	2	3	1	1	1.5	1	1.25
	21160S72B	Total Quality Management	CO1: Ability to apply TQM concepts in a selected enterprise.		3										3	2		3
			CO2: Ability to apply TQM principles in a selected enterprise.						3						3		2	
			CO3: Ability to understand Taguchi's Quality Loss Function, Performance Measures and applyQFD, TPM, COQ and BPR.		2			3	2	3	2				3	3	2	
			CO4: Ability to apply QMS and EMS in any organization.			3			3	3	2							
			AVG		2.5	3		3	2.6	3	2	3			3	2.5	2	3
	21160S72C	Human Resource Management	CO1: Students would have gained knowledge on the various aspects of HRM	2	2	1	2	2	2	1	1	2	1	1	1	1	1	1
			CO2: Students will gain knowledge needed for success as a human resources professional.	3	3	2	3	2	2	2	2	3	1	2	1	1	2	1
			CO3: Students will develop the skills needed for a successful HR manager.	3	3	3	3	3	3	2	2	3	1	2	1	1	2	1
			CO4: Students would be prepared to implement the concepts learned in the workplace.	3	3	2	3	3	2	2	2	2	1	1	1	1	1	1
			CO5: Students would be aware of the emerging concepts in the field of HRM	3	3	1	2	2	2	2	2	2	1	1	1	1	1	1
			AVG	2.8	2.8	1.8	2.6	2.6	2.2	1.8	1.8	2.4	1	1.4	1	1	1.4	1
Elective course	21147MC51B	Disaster Management	CO1: To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)	3	3	2	3	-	-	2	2	-	-	2	-	2	-	1
			CO2: To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction	3	3	3	3	-	-	2	1	-	-	2	-	2	-	1
			CO3: To develop disaster response skills by adopting relevant tools and technology	3	3	3	3	-	-	2	2	-	-	-	-	2	-	1
			CO4: Enhance awareness of institutional processes for Disaster response in the country and	3	3	2	3	-	-	2	1	-	-	2	-	2	-	1
			CO5: Develop rudimentary ability to respond to their surroundings with potential	3	3	2	3	-	-	2	2	-	-	2	-	3	-	1
			avg	3	3	3	3	-	-	2	2	-	-	2	-	2	-	1
		Well Being with Traditional Practices (Yoga, Ayurveda and	CO1:Learn the importance of different components of health	3	3	3	3	-	-	2	1	-	-	2	-	2	-	1
			CO2:Gain confidence to lead a healthy life	3	3	3	3	-	-	2	2	-	-	-	-	2	-	1
			CO3:Learn new techniques to prevent lifestyle health disorders	3	3	2	3	-	-	2	1	-	-	2	-	2	-	1
			CO4:Understand the importance of diet and workouts in maintaining health	3	3	2	3	-	-	2	2	-	-	2	-	3	-	1
	21147MC61E	Safety in Engineering industry	CO1:Understand the basic concept of safety.	3	3	3	3	-	-	2	2	-	-	2	-	2	-	1
			CO2:Obtain knowledge of Statutory Regulations and standards.	3	3	3	3	-	-	2	1	-	-	2	-	2	-	1
			CO3:Know about the safety Activities of the Working Place.	3	3	3	3	-	-	2	2	-	-	-	-	2	-	1
			CO4:Analyze on the impact of Occupational Exposures and their Remedies	3	3	2	3	-	-	2	1	-	-	2	-	2	-	1
			CO5:Obtain knowledge of Risk Assessment Techniques	3	3	2	3	-	-	2	2	-	-	2	-	3	-	1
			avg	3	3	3	3	-	-	2	2	-	-	2	-	2	-	1
	21152E64B	Satellite Communication	CO1:Identify the satellite orbits	3	3	3	3	2	3	1	1	-	1	-	1	3	3	3
			CO2:Analyze the satellite subsystems	3	2	2	3	2	3	-	-	-	-	-	1	3	3	3
			CO3:Evaluate the satellite link power budget	3	3	3	2	1	3	-	-	-	-	-	1	3	3	3
			CO4:Identify access technology for satellite	3	3	2	3	2	3	-	-	-	-	-	1	3	3	3
			CO5:Design various satellite applications	3	2	3	2	2	1	-	-	-	-	-	1	3	3	3
			avg	3	3	3	3	2	3	1	1	-	1	-	1	3	3	3
	21152E66A	Remote Sensing	CO1: To understand the principles of electromagnetic radiation.	3	2	2	3	1	3	2	-	-	-	-	1	3	3	3
			CO2: To learn the atmospheric radiation interactions.	3	2	2	3	1	3	2	-	-	-	-	1	3	3	3
			CO3: To study the laws of planetary motion.	1	2	1	3	2	3	2	-	-	-	-	1	3	3	3
			CO4: To classify the different types of resolution.	1	2	3	1	3	3	2	-	-	-	-	1	3	3	3
			CO5: To know the concepts of digital interpretation.	2	2	2	-	3	3	2	-	-	-	-	1	3	3	3
			avg	2	2	2	2	2	3	2	-	-	-	-	1	3	3	3
		Software Defined Radio	CO1: Describe the motivation behind SDN and its data plane (K2)	3	3	3	3	3	2	-	-	-	-	-	3	3	3	2
			CO2: Identify the functions of control plane (K3)	3	3	3	2	2	2	-	-	-	-	-	3	3	2	2

	21152E64A		CO3: Apply SDN to networking applications (K3)	3	3	3	3	1	2	-	-	-	-	-	3	2	3	2
			CO4: Apply various operations of network function virtualization	2	3	3	2	2	1	-	-	-	-	-	2	2	1	2
			CO5: Explain various use cases of SDN	3	3	2	2	2	1	-	-	-	-	-	2	2	2	2
			avg	3	3	3	2	2	2	-	-	-	-	-	2	2	2	2
	21152E65B	Wearable Devices	CO1: Describe the concepts of wearable system.	3	2	1	1	2	-	-	1	-	-	-	-	1	-	1
			CO2: Explain the energy harvestings in wearable device.	3	2	1	1	2	-	-	1	-	-	-	-	1	-	1
			CO3: Use the concepts of BAN in health care.	3	2	1	1	2	-	-	1	-	-	-	-	1	-	1
			CO4: Illustrate the concept of smart textile	3	2	1	1	2	-	-	1	-	-	-	-	1	-	1
			CO5: Compare the various wearable devices in healthcare system	3	2	1	1	2	-	-	1	-	-	-	-	1	-	1
			avg	3	2	1	1	2	-	-	1	-	-	-	-	1	-	1
	21152E66B	Human Assist Devices	CO1:Explain the principles and construction of artificial heart	3	3	3	3	3	2	-	-	-	-	-	3	3	1	2
			CO2:Understand various mechanical techniques that improve therapeutic technology	3	3	3	2	2	3	-	-	-	-	-	2	2	2	2
			CO3:Explain the functioning of the membrane or filter that cleanses the blood.	3	3	3	3	3	2	-	-	-	-	-	3	3	3	2
			CO4:Describe the tests to assess the hearing loss and development of wearable devices for the same.	3	3	1	1	3	2	-	-	-	-	-	2	3	1	3
			CO5:Analyze and research on electrical stimulation and biofeedback techniques in rehabilitation and physiotherapy	3	3	3	3	3	3	-	-	-	-	-	2	3	3	2
			avg	3	3	2.6	2.4	2.8	2.4	-	-	-	-	-	2.4	2.8	2	2.2
	21152E66C	MEMS Design	CO1: Understand the basics of MEMS design aspects.	3	3	2	2	2	2	-	-	-	-	-	1	3	2	2
			CO2: Apply the knowledge in the development of electro static sensors and actuators.	3	3	3	2	2	2	-	-	-	-	-	2	3	2	2
			CO3: Apply the knowledge in the development of thermal sensors and actuators.	3	3	3	2	2	2	-	-	-	-	-	2	3	2	2
			CO4: Apply the knowledge in the development of piezoelectric sensors and actuators.	3	3	3	2	2	2	-	-	-	-	-	2	3	2	2
			CO5: Apply the knowledge in the development of magnetic sensors and actuators.	3	3	3	2	2	2	-	-	-	-	-	2	3	2	2
			avg	3	3	2.8	2	2	2	-	-	-	-	-	1.8	3	2	2
	21152E65C	Fundamentals of Nanoelectronics	CO1: Understand the basics of nano electronics including quantum wires, dots and wells	3	3	2	2	2	1	-	-	-	-	-	2	2	1	1
			CO2: Use the mechanism behind quantum electronic devices	3	3	3	2	2	2	-	-	-	-	-	2	3	1	1
			CO3 : Analyze the key performance aspects of tunneling and superconducting nano electronic devices	3	3	3	2	2	2	-	-	-	-	-	2	3	1	1
			CO4: Apply the knowledge in the development of nanotubes and nanostructure devices	3	3	3	3	3	3	-	-	-	-	-	2	3	1	2
			avg	3	3	2.6	2.2	2.2	2	-	-	-	-	-	2	2.8	1	1.2
	21152E54C	Avionics Systems	CO1:Explain the principles and construction of artificial heart	3	3	3	3	3	2	-	-	-	-	-	3	3	1	2
			CO2:Understand various mechanical techniques that improve therapeutic technology	3	3	3	2	2	3	-	-	-	-	-	2	2	2	2
			CO3:Explain the functioning of the membrane or filter that cleanses the blood.	3	3	3	3	3	2	-	-	-	-	-	3	3	3	2
			CO4:Describe the tests to assess the hearing loss and development of wearable devices for the same.	3	3	1	1	3	2	-	-	-	-	-	2	3	1	3
			CO5:Analyze and research on electrical stimulation and biofeedback techniques in rehabilitation and physiotherapy	3	3	3	3	3	3	-	-	-	-	-	2	3	3	2
			avg	3	3	2.6	2.4	2.8	2.4	-	-	-	-	-	2.4	2.8	2	2.2

1 - low, 2 - medium, 3 - high, '-' - no correlation

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE OBJECTIVE B.TECH(F.T)(R-2021)

Course code	Course name	Course outcomes
21147S11	Professional English - I	• To gain understanding of basic grammatical structures and use them in right context. • To read and infer the denotative and connotative meanings of technical texts • To read and interpret information presented in tables, charts and other graphic forms • To write definitions, descriptions, narrations and essays on various topics • To present their ideas and opinions in a planned and logical manner
21148S12	Matrices and Calculus	• Apply different methods of integration in solving practical problems. • Apply multiple integral ideas in solving areas, volumes and other practical problems. • Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations • Apply multiple integral ideas in solving areas, volumes and other practical problems. • Understand how to solve the given standard partial differential equations.
21149S13	Engineering Physics	• Understand the importance of mechanics. • Express their knowledge in electromagnetic waves. • Demonstrate a strong foundational knowledge in oscillations, optics and lasers. • Understand the importance of quantum physics. • Comprehend and apply quantum mechanical principles towards the formation of energy bands.
21149S14	Engineering Chemistry	• To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water. • To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications. • To apply the knowledge of phase rule and composites for material selection requirements. • To recommend suitable fuels for engineering processes and applications. • To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

LOCAL NEEDS REGIONAL NEEDS NATIONAL NEEDS GLOBAL NEEDS

21150S15	Problem Solving and Python Programming	• CO1: Develop algorithmic solutions to simple computational problems. • CO2: Develop and execute simple Python programs. • CO3: Write simple Python programs using conditionals and looping for solving problems. • CO4: Decompose a Python program into functions. • CO5: Represent compound data using Python lists, tuples, dictionaries etc. • CO6: Read and write data from/to files in Python programs.
21147S21	Professional English - II	• To analyse problems in order to arrive at feasible solutions and communicate them in the written format. • To present their ideas and opinions in a planned and logical manner • To draft effective resumes in the context of job search. • To read and infer the denotative and connotative meanings of technical texts • To read and interpret information presented in tables, charts and other graphic forms
21148S22	Statistics and Numerical Methods	• Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems. • Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations. • Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications. • Apply multiple integral ideas in solving areas, volumes and other practical problems. • Understand how to solve the given standard partial differential equations.
21149S23D	Materials Science	• know basics of crystallography and its importance for varied materials properties • gain knowledge on the electrical and magnetic properties of materials and their applications • understand clearly of semiconductor physics and functioning of semiconductor devices • understand the optical properties of materials and working principles of various optical devices • appreciate the importance of functional nanoelectronic devices.

LOCAL NEEDS REGIONAL NEEDS NATIONAL NEEDS GLOBAL NEEDS

21154S24	Engineering Graphics	• Use BIS conventions and specifications for engineering drawing. • Construct the conic curves, involutes and cycloid. • Solve practical problems involving projection of lines. • Draw the orthographic, isometric and perspective projections of simple solids. • Draw the development of simple solids.
21153S25A	Basic Electrical and Electronics Engineering	• Compute the electric circuit parameters for simple problems. • Explain the working principle and applications of electrical machines • Analyze the characteristics of analog electronic devices • Explain the basic concepts of digital electronics • Explain the operating principles of measuring instruments
21148S31D	Transforms and Partial Differential Equations	• Understand how to solve the given standard partial differential equations. • Solve differential equations using Fourier series analysis which plays a vital role in engineering applications. • Appreciate the physical significance of Fourier series techniques in solving one- and two-dimensional heat flow problems and one-dimensional wave equations. • Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering. • Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems
21154C32	Engineering Mechanics	• Illustrate the vector and scalar representation of forces and moments • Analyse the rigid body in equilibrium • Evaluate the properties of distributed forces • Determine the friction and the effects • Discuss the basics of mechanism.
21154C33	Engineering Thermodynamics	• Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems. • Apply the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations. • Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart

LOCAL NEEDS REGIONAL NEEDS NATIONAL NEEDS GLOBAL NEEDS

		• Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations. • Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes.
21154C34	Fluid Mechanics and Machinery	• Understand the properties and behaviour in static conditions. Also, to understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics • Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel. Also, to understand the concept of boundary layer and its thickness on the flat solid surface. • Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies • Explain the working principles of various turbines and design the various types of turbines. • Explain the working principles of centrifugal, reciprocating and rotary pumps and design the centrifugal and reciprocating pumps
21154C35	Engineering Materials and Metallurgy	• Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification. • Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes. • Clarify the effect of alloying elements on ferrous and non-ferrous metals. • Summarize the properties and applications of non-metallic materials. • Explain the testing of mechanical properties.
21154C36	Manufacturing Processes	• Explain the principle of different metal casting processes. • Describe the various metal joining processes. • Illustrate the different bulk deformation processes. • Apply the various sheet metal forming process. • Apply suitable molding technique for manufacturing of plastics components.
21154C41	Theory of Machines	• Discuss the basics of mechanism. • Solve problems on gears and gear trains. • Examine friction in machine elements. • Calculate static and dynamic forces of mechanisms. • Calculate the balancing masses and their locations of reciprocating and rotating masses. Computing the frequency of free vibration, forced vibration and damping coefficient
21154C42	Thermal Engineering	• Apply thermodynamic concepts to different air standard cycles and solve problems.

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		• To solve problems in steam nozzle and calculate critical pressure ratio. • Explain the flow in steam turbines, draw velocity diagrams, flow in Gas turbines and solve problems. • Explain the functioning and features of IC engine, components and auxiliaries. • Calculate the various performance parameters of IC engines
21154C43	Hydraulics and Pneumatics	• Apply the working principles of fluid power systems and hydraulic pumps. • Apply the working principles of hydraulic actuators and control components. • Design and develop hydraulic circuits and systems. • Apply the working principles of pneumatic circuits and power system and its components. • Identify various troubles shooting methods in fluid power systems.
21154C44	Manufacturing Technology	• Apply the mechanism of metal removal process and to identify the factors involved in improving machinability. • Describe the constructional and operational features of centre lathe and other special purpose lathes. • Describe the constructional and operational features of reciprocating machine tools. • Apply the constructional features and working principles of CNC machine tools. • Demonstrate the Program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component.
21154C45	Strength of Materials	• Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes. • Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment. • Apply basic equation of torsion in designing of shafts and helical springs • Calculate slope and deflection in beams using different methods. • Analyze thin and thick shells for applied pressures.
21149S46	Environmental Sciences and Sustainability	• To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation. • To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society. • To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations. • To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal

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		development. • To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.
21154C51	Design of Machine Elements	• Explain the design machine members subjected to static and variable loads. • Apply the concepts design to shafts, key and couplings. • Apply the concepts of design to bolted, Knuckle, Cotter, riveted and welded joints. • Apply the concept of design helical, leaf springs, flywheels, connecting rods and crank shafts. • Apply the concepts of design and select sliding and rolling contact bearings, seals and gaskets.
21154C52	Metrology and Measurements	• Discuss the concepts of measurements to apply in various metrological instruments. • Apply the principle and applications of linear and angular measuring instruments, assembly and transmission elements. • Apply the tolerance symbols and tolerance analysis for industrial applications. • Apply the principles and methods of form and surface metrology. • Apply the advances in measurements for quality control in manufacturing Industries.
21154C62	Heat and Mass Transfer	• Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems. • Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems. • Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems. • Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems. • Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications.
21154C75	Mechatronics and IoT	• Explain Select suitable sensors and actuators to develop mechatronics systems. • Discuss Devise proper signal conditioning circuit for mechatronics systems, and also able to implement PLC as a controller for an automated system. • Elucidate the fundamentals ofIot and Embedded Systems • Discuss Control I/O devices through Arduino and Raspberry Pi. • Design and develop an apt mechatronics/IoT based

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		system for the given real-time application.
21154C76	Computer Integrated Manufacturing	• Discuss the basics of computer aided engineering. • Choose appropriate automotive tools and material handling systems. • Discuss the overview of group technology, FMS and automation identification methods. • Design using computer aided process planning for manufacturing of various components • Acquire knowledge in computer process control techniques.
21154C77	Industrial Management	• Discuss basic concepts of management; approaches to management; contributors to management studies; various forms of business organization and trade unions function in professional organizations. • Discuss the planning; organizing and staffing functions of management in professional organization. • Apply the leading; controlling and decision making functions of management in professional organization. • Discuss the organizational theory in professional organization. • Apply principles of productivity and modern concepts in management in professional organization.
21154E53A	CAD/CAM	• Discuss the basics of the design and concepts. • Develop the two dimensional drafting and projection views. • Discuss the three dimensional modeling, parametric and Non-parametric modeling • Discuss the assembly modeling and top down, bottom up approaches. • Develop the computer aided machining and wirting part programming.
21154E54A	Robotics	• State the basic concepts and terminologies of robots • Know the Procedures for Forward and Inverse Kinematics, Dynamics for Various Robots • Derive the Forward and Inverse Kinematics, Dynamics for Various Robots • Apply the various programming techniques in industrial applications • Analyze the use of various types of robots in different applications
21154E55A	Automobile Engineering	• Recognize the various parts of the automobile and their functions and materials. • Discuss the engine auxiliary systems and engine emission control. • Distinguish the working of different types of transmission systems. • Explain the Steering, Brakes and Suspension

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		Systems. • Predict possible alternate sources of energy for IC Engines.
21154E63A	Design of Transmission System	• Apply the concepts of design to belts, chains and rope drives. • Apply the concepts of design to spur, helical gears. • Apply the concepts of design to worm and bevel gears. • Apply the concepts of design to gear boxes. • Apply the concepts of design to cams, brakes and clutches
21154E64A	Material Handling and solid processing Equipment	• Discuss the basic concepts of material handling equipment. • Explain the basic working principles of various industrial Vehicles. • Develop the basic working principles of various conveyors. • Elaborate the basic working principles of various Auxiliary Equipment and Hoisting Equipment. • Explain the basic working principles of various Bulk Handling Equipment and Systems
21154E65A	Power Plant Engineering	• Explain the layout, construction and working of the components inside a thermal power plant. • Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants. • Explain the layout, construction and working of the components inside nuclear power plants. • Explain the layout, construction and working of the components inside Renewable energy power plants • Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.
21154E66C	Process Planning and Cost Estimation	• Discus select the process, equipment and tools for various industrial products. • Explain the prepare process planning activity chart. • Explain the concept of cost estimation. • Compute the job order cost for different type of shop floor. • Calculate the machining time for various machining operations.
21150OE61A	IoT Concepts and Applications	• Explain the concept of IoT. • Understand the communication models and various protocols for IoT. • Design portable IoT using Arduino/Raspberry Pi /open platform • Apply data analytics and use cloud offerings related to IoT. • Analyze applications of IoT in real time scenario.
21150OE72A	Artificial Intelligence and Machine Learning	• Understand the foundations of AI and the structure of Intelligent Agents

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	Fundamentals	• Use appropriate search algorithms for any AI problem • Study of learning methods • : Solving problem using Supervised learning • Solving problem using Unsupervised learning
21152OE73A	Renewable Energy Technologies	• Discuss the Indian and global energy scenario. • Describe the various solar energy technologies and its applications. • Explain the various wind energy technologies. • Explore the various bio-energy technologies. • Discuss the ocean and geothermal technologies.
21152OE74B	Geographical Information System	• Have basic idea about the fundamentals of GIS. • Understand the types of data models. • Get knowledge about data input and topology • Gain knowledge on data quality and standards • Understand data management functions and data output

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DEPARTMENT OF MECHNANICAL ENGINEERING
B.TECH - FULL TIME (UG-2021)

COURSE CODE	COURSE TITLE	COURSE OUTCOMES	PO												PSO		
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
21147S11	PROFESSIONAL ENGLISH - I	To use appropriate words in a professional context	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
		To gain understanding of basic grammatical structures and use them in right context.	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
		To read and infer the denotative and connotative meanings of technical texts	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
		To read and interpret information presented in tables, charts and other graphic forms	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
		To write definitions, descriptions, narrations and essays on various topics	2	3	3	3	-	3	3	3	2	3	-	3	-	-	-
		AVg.	1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-
21148S12	MATRICES AND CALCULUS	Use the matrix algebra methods for solving practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-

		Apply differential calculus tools in solving various application problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Able to use differential calculus ideas on several variable functions.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Apply different methods of integration in solving practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Apply multiple integral ideas in solving areas, volumes and other practical problems	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Avg	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
21149S13	**ENGINEERING PHYSICS**	Understand the importance of mechanics.	3	3	2	1	1	1	-	-	-	-	-	-	-	-	-
		Express their knowledge in electromagnetic waves.	3	3	2	1	2	1	-	-	-	-	-	-	-	-	-
		Demonstrate a strong foundational knowledge in oscillations, optics and lasers.	3	3	2	2	2	1	-	-	-	-	-	1	-	-	-
		Understand the importance of quantum physics.	3	3	1	1	2	1	-	-	-	-	-	-	-	-	
		Comprehend and apply quantum mechanical principles towards the formation of energy bands.	3	3	1	1	2	1	-	-	-	-	-	-	-	-	-
		AVG	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-
21149S14	**ENGINEERING CHEMISTRY**	To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	3	2	2	1	-	1	1	-	-	-	-	1	-	-	-
		To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.	2	-	-	1	-	2	2	-	-	-	-	-	-	-	-

		To apply the knowledge of phase rule and composites for material selection requirements.	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		To recommend suitable fuels for engineering processes and applications.	3	1	1	-	-	1	2	-	-	-	-	-	-	-	-	-
		To recognize different forms of energy resources and apply them for suitable applications in energy sectors.	3	1	2	1	-	2	2	-	-	-	-	2	-	-	-	-
		Avg.	2.8	1.3	1.6	1	-	1.5	1.8	-		-	-	1.5	-	-	-	-
21150S15	**PROBLEM SOLVING AND PYTHON PROGRAMMING**	Develop algorithmic solutions to simple computational problems	3	3	3	3	2	-	-	-	-	-	2	2	3		3	
		Develop and execute simple Python programs.	3	3	3	3	2	-	-	-	-	-	2	2	3		-	
		Write simple Python programs using conditionals and looping for solving problems.	3	3	3	3	2	-	-	-	-	-	2	-	3		-	
		Decompose a Python program into functions	2	2	-	2	2	-	-	-	-	-	1	-	3		-	
		Represent compound data using Python lists, tuples, dictionaries etc	1	2	-	-	1	-	-	-	-	-	1	-	2		-	
		AVg.	2	2	-	-	2	-	-	-	-	-	1	-	2		-	
21150L16	**PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**	On completion of the course, students will be able to:	3	3	3	3	3	-	-	-	-	-	3	2	3	3	-	
		Develop algorithmic solutions to simple computational problems Develop and execute simple Python programs.	3	3	3	3	3	-	-	-	-	-	3	2	3	-	-	
		Implement programs in Python using conditionals and loops for solving problems.	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-	

		Deploy functions to decompose a Python program.	3	2	-	2	2	-	-	-	-	-	1	-	3	-	-
		Process compound data using Python data structures.	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
		Process Value data using Python data structures.	2	-	-	-	2	-	-	-	-	-	1	-	2	-	-
		AVg.	2	3	3	3	2	-	-	-	-	-	2	2	3	3	-
21149L17	**PHYSICS AND CHEMISTRY LABORATORY**	Understand the functioning of various physics laboratory equipment.	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
		Use graphical models to analyze laboratory data.	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
		Use mathematical models as a medium for quantitative reasoning and describing physical reality.	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
		Access, process and analyze scientific information.	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
		Solve problems	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
		AVG	3	2.4	2.6	1	1										
21147L18	**COMMUNICATION LABORATORY-I**	To listen to and comprehend general as well as complex academic information	3	3	3	3	1	3	3	3	3	3	3	3	-		-
		To listen to and understand different points of view in a discussion	3	3	3	3	1	3	3	3	3	3	3	3	-		-
		To speak fluently and accurately in formal and informal communicative contexts	3	3	3	3	1	3	3	3	3	3	3	3	-		-

		To describe products and processes and explain their uses and purposes clearly and accurately	3	3	3	3	1	3	3	3	3	3	3	3	-		-
		To express their opinions effectively in both formal and informal discussions	3	3	3	3	1	3	3	3	3	3	3	3	-		-
		AVg.	3	3	3	3	1	3	3	3	3	3	3	3	-		-
21147S21	**PROFESSIONAL ENGLISH - II**	To compare and contrast products and ideas in technical texts.	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
		To identify and report cause and effects in events, industrial processes through technical texts	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
		To analyse problems in order to arrive at feasible solutions and communicate them in the written format.	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
		To present their ideas and opinions in a planned and logical manner	3	3	3	3	2	3	3	3	2	3	3	3	-	-	-
		To draft effective resumes in the context of job search.	-	-	-	-	-	-	-	-	3	3	3	3	-	-	-
		AVg.	3	3	3	3	2.75	3	3	3	2.2	3	3	3	-	-	-
21148S22	**STATISTICS AND NUMERICAL METHODS**	Apply the concept of testing of hypothesis for small and large samples in real life problems.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Apply the basic concepts of classifications of design of experiments in the field of agriculture.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Understand the knowledge of various techniques and methods for solving first and second order ordinary differential	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

		equations.																
		Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Avg	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
21149S23D	**MATERIALS SCIENCE**	know basics of crystallography and its importance for varied materials properties	3	2	1	2	1	1	-	-	-	-	-	-	-	-	-
		gain knowledge on the electrical and magnetic properties of materials and their applications	3	2	1	1	2	1	1	-	-	-	-	-	-	-	-
		understand clearly of semiconductor physics and functioning of semiconductor devices	3	2	2	2	2	1	-	-	-	-	-	-	-	-	-
		understand the optical properties of materials and working principles of various optical devices	3	2	2	1	2	2	-	-	-	-	-	1	-	-	-
		appreciate the importance of functional nanoelectronic devices.	3	2	2	1	2	1	-	-	-	-	-	-	-	-	-
		AVG	3	2	1.6	1.4	1.8	1.2	1	-	-	-	-	1	-	-	-
21153S25A	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	Compute the electric circuit parameters for simple problems	2	2	1					1				2			1
		Explain the working principle and applications of electrical machines	2	2	1					1				2			1
		Analyze the characteristics of analog electronic devices	2	1	1					1				2			1
		Explain the basic concepts of digital electronics	2	2	1					1				2			1

		Explain the operating principles of measuring instruments	2	2	1					1				2			1
		CO/PO & PSO Average	2	1.8	1					1				2			1
21154S24	**ENGINEERING GRAPHICS**	Use BIS conventions and specifications for engineering drawing.	3	1	2		2					3		2	2	2	
		Construct the conic curves, involutes and cycloid.	3	1	2		2					3		2	2	2	
		Solve practical problems involving projection of lines.	3	1	2		2					3		2	2	2	
		Draw the orthographic, isometric and perspective projections of simple solids.	3	1	2		2					3		2	2	2	
		Draw the development of simple solids.	3	1	2		2					3		2	2	2	
		Avg.	3	1	2		2					3		2	2	2	
21154L27	**ENGINEERING PRACTICES LABORATORY**	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.	3	2			1	1	1					2	2	1	1
		Wire various electrical joints in common household electrical wire work.	3	2			1	1	1					2	2	1	1
		Weld various joints in steel plates using arc welding work; Machine various simple processeslike turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.	3	2			1	1	1					2	2	1	1
		Avg.	3	2			1	1	1					2	2	1	1

21153L28C	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LABORATORY**	Use experimental methods to verify the Ohm's and Kirchhoff's Laws.	3	3	2	1	1			1.5	2						1
		Analyze experimentally the load characteristics of electrical machines	3	3	2	1	1			1.5	2						1
		Analyze the characteristics of basic electronic devices	3	3	2	1	1			1.5	2						1
		Use DSO to measure the various parameters	3	3	2	1	1			1.5	2						1
		Use DSO to measure the various measurements	3	3	2	1	1			1.5	2						1
		CO/PO & PSO	3	3	2	1	1			1.5	2						1
		Average															
21148S31D	**TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS**	Understand how to solve the given standard partial differential equations.	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
		Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
		Appreciate the physical significance of Fourier series techniques in solving one- and two- dimensional heat flow problems and one-dimensional wave equations.	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
		Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
		Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-

		Avg	3	3	1	1	0	0	0	0	2	0	0	3	-	-	-
21154C32	**ENGINEERING MECHANICS**	Illustrate the vector and scalar representation of forces and moments	3	2	2	1	2							2	3	1	1
		Analyse the rigid body in equilibrium	3	2	2	1	2							2	3	1	1
		Evaluate the properties of distributed forces	3	2	3	1	2							2	3	1	2
		Determine the friction and the effects by the laws of friction	3	2	3	1	2							2	3	1	2
		Calculate dynamic forces exerted in rigid body	3	2	3	1	2							2	3	1	2
21154C33	**ENGINEERING THERMODYNAMICS**	Apply the zeroth and first law of thermodynamics by formulating temperature scales and calculating the property changes in closed and open engineering systems	3	3	2	1								2			
		Apply the second law of thermodynamics in analysing the performance of thermal devices through energy and entropy calculations	3	3	2	1								2			
		Apply the second law of thermodynamics in evaluating the various properties of steam through steam tables and Mollier chart	3	3	2	1					1		1	2	3		3
		Apply the properties of pure substance in computing the macroscopic properties of ideal and real gases using gas laws and appropriate thermodynamic relations	3	3	2	1		1			2		1	2	3	2	
		Apply the properties of gas mixtures in calculating the properties of gas mixtures and applying various thermodynamic relations to calculate property changes.	3	3	2	1		1			2		1	2	3	2	3
21154C34	**FLUID MECHANICS AND**	Understand the properties and behaviour in static conditions. Also, to understand the conservation laws applicable to fluids and its application through fluid kinematics and dynamics	3	3	2	2	1	2	2	1	2	1	1	2	3	2	3

	MACHINERY	Estimate losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel. Also, to understand the concept of boundary layer and its thickness on the flat solid surface.	3	3	3	2	1	2	2	1	2	1	1	2	3	2	3
		Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performances of prototype by model studies	3	3	3	3	1	2	2	1	2	1	1	2	3	3	3
		Explain the working principles of various turbines and design the various types of turbines.	3	3	3	3	1	2	2	1	2	1	1	3	3	2	2
		Explain the working principles of centrifugal, reciprocating and rotary pumps and design the centrifugal and reciprocating pumps	3	3	3	3	1	2	2	1	2	1	1	3	3	2	2
21154C35	**ENGINEERING MATERIALS AND METALLURGY**	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.	3	1	3	2								2	2	1	2
		Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.	3	1	3	1		2		1				2	2	1	2
		Clarify the effect of alloying elements on ferrous and non-ferrous metals.	3	1	3									2	2	1	2
		Summarize the properties and applications of non-metallic materials.	3	1	3				2					2	2	1	2
		Explain the testing of mechanical properties	3	1	3	2	2							2	2	1	2
21154C36	**MANUFACTURING PROCESSES**	Explain the principle of different metal casting processes.			2			2	3	1	1	-	-	1	3	1	-
		Describe the various metal joining processes.			2			2	3	1	1	-	-	1	3	1	-
		Illustrate the different bulk deformation processes.			2			2	2	1	1	-	-	1	3	1	-

		Apply the various sheet metal forming process.			2			2	2	1	1	-	-	1	3	1	-
		Apply suitable molding technique for manufacturing of plastics components.			2		2	2	2	1	1	-	-	1	3	1	-
21154L37	**COMPUTER AIDED MACHINE DRAWING**	Prepare standard drawing layout for modelled assemblies with BoM.	1	2			3				3	2		3	2	2	2
		Model orthogonal views of machine components.	1	2			3				3	2		3	2	2	2
		Prepare standard drawing layout for modelled parts	1	2			3				3	2		3	2	2	2
21154L38	**MANUFACTURING TECHNOLOGY LABORATORY**	Demonstrate the safety precautions exercised in the mechanical workshop and join two metals using GMAW.	3						1		2			1	1	2	2
		The students able to make the work piece as per given shape and size using machining process such as rolling, drawing, turning, shaping, drilling and milling.	3						1		2			1	1	2	2
		The students become make the gears using gear making machines and analyze the defects in the cast and machined components	3						1		2			1	1	2	2
21154C41	**THEORY OF MACHINES**	Discuss the basics of mechanism.	3	2	2		2			1				1	3		1
		Solve problems on gears and gear trains.	3	2	2		2			1				1	3		1
		Examine friction in machine elements.	3	2	2		2			1				1	3		1
		Calculate static and dynamic forces of mechanisms.	3	2	2		2			1				1	3		1
		Calculate the balancing masses and their locations of reciprocating and rotating masses. Computing the frequency of	3	2	2		2			1				1	3		1

		free vibration, forced vibration and damping coefficient.																
21154C42	**THERMAL ENGINEERING**	Apply thermodynamic concepts to different air standard cycles and solve problems.	3	2	1	1								1	2	1	
		Apply thermodynamic concepts to different air standard cycles and solve problems.	3	2	2	1								1	2	1	
		To solve problems in steam nozzle and calculate critical pressure ratio.	3	2	2	1								1	2	1	
		Explain the flow in steam turbines, draw velocity diagrams, flow in Gas turbines and solve problems.	3	2	1	1								1	2	1	
		Calculate the various performance parameters of IC engines	3	2	1	1								1	2	1	
21154C43	**HYDRAULICS AND PNEUMATICS**	Apply the working principles of fluid power systems and hydraulic pumps.	2	1	1	1								1	2	1	1
		Apply the working principles of hydraulic actuators and control components.	2	1	1	1								1	2	1	1
		Design and develop hydraulic circuits and systems.	2	1	1	1								1	2	1	1
		Apply the working principles of pneumatic circuits and power system and its components.	2	1	1	1								1	2	1	1
		Identify various troubles shooting methods in fluid power systems.	2	1	1	1								1	2	1	1
21154C44	**MANUFACTURING TECHNOLOGY**	Apply the mechanism of metal removal process and to identify the factors involved in improving machinability.	3	3	3	1	1	1	3			3		2	3	3	2
		Describe the constructional and operational features of centre lathe and other special purpose lathes.	3	3	3	1	1	1	3			3		2	3	2	2

		Describe the constructional and operational features of reciprocating machine tools.	3	3	3	1	1	1	3			3		2	3	2	2
		Apply the constructional features and working principles of CNC machine tools.	3	3	2	1	1	1	3			3		2	3	2	2
		Demonstrate the Program CNC machine tools through planning, writing codes and setting up CNC machine tools to manufacture a given component	3	3	3	1	1	1	3			3		2	3	2	3
21154C45	**STRENGTH OF MATERIALS**	Understand the concepts of stress and strain in simple and compound bars, the importan	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
		of principal stresses and principal planes.	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
		Understand the load transferring mechanism in beams and stress distribution due shearing force and bending moment.	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
		Apply basic equation of torsion in designing of shafts and helical springs	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
		Calculate slope and deflection in beams using different methods.	3	3	3	3	2	3	1	3	2	3	1	3	3	2	3
21149S46	**ENVIRONMENTAL SCIENCES AND SUSTAINABILITY**	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-
		To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
		To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
		To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-

		To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
		Avg.	2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-
21154L47	**STRENGTH OF MATERIALS AND FLUID MACHINERY LABORATORY**	Determine the tensile, torsion and hardness properties of metals by testing	3	2	1	3	3	1	1	1	3	1	1	2	2	2	1
		Determine the stiffness properties of helical and carriage spring	3	2	1	3	3	1	1	1	3	1	1	2	3	2	1
		Apply the conservation laws to determine the coefficient of discharge of a venturimeter	3	3	2	3	2	1	1	1	3	1	1	2	3	2	1
21154L48	**THERMAL ENGINEERING LABORATORY**	Conduct tests to evaluate performance characteristics of IC engines	2	2	1	1					1			1	1	1	1
		Conduct tests to evaluate the performance of refrigeration cycle	2	2	1	1					1			1	1	1	1
		Conduct tests to evaluate Performance and Energy Balance on a Steam Generator	2	2	1	1					1			1	1	1	1
21154C51	**DESIGN OF MACHINE ELEMENTS**	Explain the design machine members subjected to static and variable loads.	2	2	3					1	1			2	3	2	2
		Apply the concepts design to shafts, key and couplings.	2	2	3					1	1			2	3	2	2
		Apply the concepts of design to bolted, Knuckle, Cotter, riveted and welded joints.	2	2	3					1	1			2	3	2	2
		Apply the concept of design helical, leaf springs, flywheels, connecting rods and crank shafts.	2	2	3					1	1			2	3	2	2
		Apply the concepts of design and select sliding and rolling contact bearings, seals and gaskets.	2	2	3					1	1			2	3	2	2

21154C52	**METROLOGY AND MEASUREMENTS**	Discuss the concepts of measurements to apply in various metrological instruments.	3	2	2	2					1			1	3	2	1
		Apply the principle and applications of linear and angular measuring instruments, assembly and transmission	3	2	2	2					1			1	3	2	1
		Apply the tolerance symbols and tolerance analysis for industrial applications.	3	2	2	2					1			1	3	2	1
		Apply the principles and methods of form and surface metrology.	3	2	2	2					1			1	3	2	1
		Apply the advances in measurements for quality control in manufacturing Industries.	3	2	2	2					1			1	3	2	1
21154L58	**METROLOGY AND DYNAMICS LABORATORY**	The students able to measure the gear tooth dimensions, angle using sine bar, straightness.		2	2	3		2	2		1	2	2		3	2	2
		Determine mass moment of inertia of mechanical element, governor effort and range of sensitivity.		2	2	3		2	2		1	2	2		2	2	2
		Determine the natural frequency and damping coefficient, critical speeds of shafts,		2	2	3		2	2		1	2	2		3	2	2
		Avg	-	2	2	3	-	2	2	-	1	2	2	-	2.6	2	2
21154C62	**HEAT AND MASS TRANSFER**	Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems.	3	3	3	2					1			1	3	2	1
		Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems	3	3	3	3					1			1	3	2	1
		Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems	3	3	3	2					1			1	3	2	1

		Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems	3	3	3	2					1			1	3	2	1
		Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications.	3	3	3	2					1			1	3	2	1
21154L68	**CAD/CAM LABORATORY**	Design experience in handling 2D drafting and 3D modelling software systems	2	2	2	2	3				2			1	3	3	1
		Design 3 Dimensional geometric model of parts, sub-assemblies, assemblies and export it to drawing	2	2	2	2	3				2			1	3	3	1
		Demonstrate manual part programming and simulate the CNC program and Generate part programming using G and M code through CAM software.	2	2	2	2	3				2			1	3	3	1
21154L69	**HEAT TRANSFER LABORATORY**	Conduct experiment on Predict the thermal conductivity of solids and liquids		1	3	2					1			1	2	2	3
		Conduct experiment on Estimate the heat transfer coefficient values of various fluids.		1	3	2					1			1	2	2	3
		Conduct experiment on Test the performance of tubes in tube heat exchangers		1	3	2					1			1	2	2	3
21154C75	**MECHATRONICS AND IoT**	Explain Select suitable sensors and actuators to develop mechatronics systems.					1	-	-	-	-	-	-	-	1	2	3
		Discuss Devise proper signal conditioning circuit for mechatronics systems, and also able to implement PLC as a controller for an automated system.					2	-	-	-	1	-	-	2	1	2	3
		Elucidate the fundamentals ofIot and Embedded Systems					2	-	2	-	-	-	-	-	1	2	3
		Discuss Control I/O devices through Arduino and Raspberry Pi.					3	-	-	-	3	-	-	3	1	2	3

		Design and develop an apt mechatronics/IoT based system for the given real-time application.					3	-	2	-	3	-	-	3	1	2	3
		Discuss the basics of computer aided engineering.	3	2	2	1	2				1			1	2	1	3
		Choose appropriate automotive tools and material handling systems.	3	2	2	1	2				1			1	2	1	3
		Discuss the overview of group technology, FMS and automation identification methods.	3	2	2	1	2				1			1	2	1	3
21154C76	**COMPUTER INTEGRATED MANUFACTURING**	Design using computer aided process planning for manufacturing of various components	3	2	2	1	2				1			1	2	1	3
		Acquire knowledge in computer process control techniques.	3	2	2	1	2				1			1	2	1	3
		Discuss basic concepts of management; approaches to management; contributors to management studies; various forms of business organization and trade unions function in professional organizations.	1	1	1	1		3	2	3	2	3	2	3	1	1	1
		Discuss the planning; organizing and staffing functions of management in professional organization.	1	1	1	1		3	2	3	2	3	2	3	1	1	1
		Apply the leading; controlling and decision making functions of management in professional organization.	1	1	1	1		3	2	3	2	3	2	3	1	1	1
21154C77	**INDUSTRIAL MANAGEMENT**	Discuss the organizational theory in professional organization.	1	1	1	1		3	2	3	2	3	2	3	1	1	1
		Apply principles of productivity and modern concepts in management in professional organization	1	1	1	1		3	2	3	2	3	2	3	1	1	1
		Familiarization with concept of IoT and its open source microcontroller/SBC.	1	3	-	-	-	3	-	-	3	1	1	3	-	-	-
		Write a program to turn ON/OFF motor using microcontroller/SBC through internet.	1	3	-	-	-	3	-	-	3	1	1	3	-	-	-

		Write a program to interface sensors to display the data on the screen through internet.	1	3	-	-	-	3	-	-	3	1	1	3	-	-	-
		Interface the sensors with microcontroller/SBC and write a program to turn ON/OFF	3	3	-	-	-	3	-	-	3	3	3	3	-	-	-
		Take up any challenging practical problems and find solution by formulating proper methodology.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
		Avg.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
21154E53 A	**CAD/CAM**	Discuss the basics of the design and concepts.	3	2	2	2	2				1			1	3	3	2
		Develop the two dimensional drafting and projection views.	3	2	2	2	2				1			1	3	3	2
		Discuss the three dimensional modeling, parametric and Non-parametric modeling	3	2	2	2	2				1			1	3	3	2
		Discuss the assembly modeling and top down, bottom up approaches.	3	2	2	2	2				1			1	3	3	2
		Develop the computer aided machining and wirting part programming	3	2	2	2	2				1			1	3	3	2
21154E54 A	**ROBOTICS**	State the basic concepts and terminologies of robots	3	2	3	1	2							1	2	1	3
		Know the Procedures for Forward and Inverse Kinematics, Dynamics for Various Robots	3	2	3	1	2							1	2	1	3
		Derive the Forward and Inverse Kinematics, Dynamics for Various Robots	3	2	3	1	2							1	2	1	3
		Apply the various programming techniques in industrial applications Analyze the use of various types of robots in different applications	3	2	3	1	2							1	2	2	3

		CO5	3	2	3	1	3							1	2	2	3
		CO/PO & PSO Average	3	2	3	1	2 2							1	2	1.4	3
21154E55 A	**AUTOMOBILE ENGINEERING**	Recognize the various parts of the automobile and their functions and materials.		1	2	1					1			1	1	2	1
		Discuss the engine auxiliary systems and engine emission control.		1	2	1					1			1	1	2	1
		Distinguish the working of different types of transmission systems.		1	2	1					1			1	1	2	1
		Explain the Steering, Brakes and Suspension Systems.		1	2	1					1			1	1	2	1
		Predict possible alternate sources of energy for IC Engines.		1	2	1					1			1	1	2	1
21154E65 A	**POWER PLANT ENGINEERING**	Explain the layout, construction and working of the components inside a thermal power plant.	3	1	1	1		1	3			1		1	2	2	1
		Explain the layout, construction and working of the components inside a Diesel, Gas and	3	1	1	1		1	3			1		1	2	2	1
		Combined cycle power plants.	3	1	1	1		1	3			1		1	2	2	1
		Explain the layout, construction and working of the components inside nuclear power plants.	3	1	1	1		1	3			1		1	2	2	1
		Explain the layout, construction and working of the components inside Renewable energy	3	1	1	1		1	3			1		1	2	2	1

21154E64D	**NON-TRADITIONAL MACHINING PROCESSES**	Formulate different types of non-traditional machining processes and evaluate mechanical energy based non-based non-traditional machining processes.	3		1		1		1		1	1		1	2	2	2
		Illustrate chemical and electro chemical energy based processes.	3		1		1		1		1	1		1	2	2	2
		Evaluate thermo-electric energy based processes.	3		1		1		1		1	1		1	2	2	2
		Interpret nano finishing processes.	3		2		1		1		1	1		1	2	2	2
		Analyse hybrid non-traditional machining processes and differentiate non- traditional machining processes.	3		3		3		1		1	1		1	3	3	3
		Evaluate the fuel properties and arrive at proximate and ultimate analysis of fuels.	3	1	1	1					1			1	2	1	1
		Analyze different types of boilers and compute their performance parameters.	3	2	1	1					1			1	2	1	1
		Evaluate the performance parameters of an air compressor	3	1	1	1					1			1	2	1	1
21154E63B	**THERMAL POWER ENGINEERING**	Apply the working principles of various refrigeration systems and perform cop calculations	3	2	1	1					1			1	2	1	1
		Analyze the psychrometric properties and how they are utilized in arriving at calculations to determine heating loads.	3	1	1	1					1			1	2	1	1
		Apply the fundamentals of compressible flow concepts and the use of gas tables.	3	2	1	1					1			1	3	1	2
		Analyze the compressible flow behaviour in constant area ducts.	3	2	1	1					1			1	3	1	2
		Analyze the development of shock waves and its effects.	3	2	1	1					1			1	3	1	2

21154E66A	**GAS DYNAMICS AND JET PROPULSION**	Explain the types of jet engines and their performance parameters.	3	2	1	1					1			1	3	1	2
		Explain the types of rocket engines and their performance parameters.	3	2	1	1					1			1	3	1	2
		Expand their vocabulary and gain practical techniques to read and comprehend a wide range of texts with the emphasis required	1	3	3	1	3	3	3	3	1	3	1	3	-	-	-
		Identify errors with precision and write with clarity and coherence	2	3	3	2	3	3	3	3	1	3	3	3	-	-	-
		Understand the importance of task fulfilment and the usage of task-appropriate vocabulary	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
		Communicate effectively in group discussions, presentations and interviews	2	2	2	2	2	2	2	2	3	3	3	3	-	-	-
		Write topic based essays with precision and accuracy	2	2	2	2	2	2	2	2	2	3	2	3	-	-	-
		AVg.	2	2.6	2.6	2	2.6	2.6	2.6	2.6	2	3	2.4	3	-	-	-
21150E76A	**ENGLISH FOR COMPETITIVE EXAMINATIONS**	Expand their vocabulary and gain practical techniques to read and comprehend a wide range of texts with the emphasis required	1	1	3	3	1	3	3	3	3	1	3	1	3	-	-
		Identify errors with precision and write with clarity and coherence	2	2	3	3	2	3	3	3	3	1	3	3	3	-	-
		Understand the importance of task fulfilment and the usage of task-appropriate vocabulary	3	3	3	3	3	3	3	3	3	3	3	3	3	-	-
		Communicate effectively in group discussions, presentations and interviews	4	2	2	2	2	2	2	2	2	3	3	3	3	-	-
		Write topic based essays with precision and accuracy	5	2	2	2	2	2	2	2	2	2	3	2	3	-	-

21150OE 74B	**GEOGRAPHICAL INFORMATION SYSTEM**	Discuss the importance of economic sustainability.	3	-	2	-	-	-	2	2	-	1	1	2	2	2	1
		Describe the importance of sustainable practices.	3	-	-	-	-	-	2	-	-	1	1	2	1	2	2
		Plan for sustainable operation of industry with environmental, cost consciousness.	3	-	-	-	-	-	2	3	-	1	1	2	1	2	2
		Identify drivers and barriers for the given conditions	3	-	3	-	-	-	2		-	1	1	2	2	2	1
		Formulate strategy in sustainable manufacturing.	3	-	3	-	-	-	2	2	-	1	1	2	2	2	1

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SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
2021R

Local Needs Regional Needs National Needs Global Needs

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

1.1.1 PROGRAMME OUTCOMES
B.TECH

Engineering Graduates will be able to:

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of industrial problems.

PO 2: Problem analysis: Identify, formulates, and solve complex engineering problems. with high degree ofcompetence.

PO3: Conduct investigations of complex problems: Use research-based knowledge andresearch methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO4: Design/development of solutions: Design solutions for mechanical engineering problemsand design components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, andmodern engineering use modern tools, software and equipment to analyze multidisciplinary.

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge toassesssocietal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineeringsolutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities andnorms of the engineering practice.

PO9: Individual and team work: Function effectively as an individual, and as a member orleader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with theengineering community and with society at large, such as, being able to comprehend and write

PO 11: effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 12: Project management and finance: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 13: Life-long learning: Recognize the need for, and have the preparation and ability toengage in independent and life-long learning in the broadest context of technological change.

Local Needs Regional Needs National Needs Global Needs

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME OUTCOMES
M.TECH
M.TECH- COMPUTER SCIENCE AND ENGINEERING (Full Time - 2 Yrs; Part Time – 3Yrs)

PO1: **Engineering knowledge**: Apply the knowledge of mathematics, science, engineeringfundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: **Problem analysis**: Identify, formulate, review research literature, and analyze complexengineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: **Design/development of solutions**: Design solutions for complex engineering problemsand design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4: **Conduct investigations of complex problems**: Use research-based knowledge andresearch methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: **Modern tool usage**: Create, select, and apply appropriate techniques, resources, andmodern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6: **The engineer and society**: Apply reasoning informed by the contextual knowledge toassess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: **Environment and sustainability**: Understand the impact of the professional engineeringsolutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities andnorms of the engineering practice.

PO9: **Individual and team work**: Function effectively as an individual, and as a member orleader in diverse teams, and in multidisciplinary settings.

PO10: **Communication**: Communicate effectively on complex engineering activities with theengineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: **Project management and finance**: Demonstrate knowledge and understanding of theengineering and management principles and apply these to one‘s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: **Life-long learning**: Recognize the need for, and have the preparation and ability toengage in independent and life-long learning in the broadest context of technological change.

Local Needs Regional Needs National Needs Global Needs

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

PROGRAMME SPECIFIC OUTCOMES

B.TECH

PSO1: To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.

PSO2: To apply design principles and best practices for developing quality products for scientific and business applications.

PSO3: To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

M.TECH

PSO1: To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.

PSO2: To apply design principles and best practices for developing quality products for scientific and business applications.

PSO3: To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Local Needs Regional Needs National Needs Global Needs

Course code	Course name	Course outcomes
21147S11	Professional English - I	• To use appropriate words in a professional context • To gain understanding of basic grammatic structures and use them in right context. • To read and infer the denotative and connotative meanings of technical texts • To write definitions, descriptions, narrations and essays on various topics.
21148S12	Matrices And Calculus	• Use the matrix algebra methods for solving practical problems. • Apply differential calculus tools in solving various application problems. • Able to use differential calculus ideas on several variable functions. • Apply different methods of integration in solving practical problems. • Apply multiple integral ideas in solving areas, volumes and other practical problems.
21149S13	Engineering Physics	• Understand the importance of mechanics. • Express their knowledge in electromagnetic waves. • Demonstrate a strong foundational knowledge in oscillations, optics and lasers. • Understand the importance of quantum physics. • Comprehend and apply quantum mechanical principles towards the formation of energy bands.
21149S14	Engineering Chemistry	• To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water • To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications. • To apply the knowledge of phase rule and composites for material selection requirements. • To recommend suitable fuels for engineering processes and applications. • To recognize different forms of energy resources and apply them for suitable applications in energy sectors.

Local Needs Regional Needs National Needs Global Needs

		• Develop algorithmic solutions to simple computational problems • Read, write, execute by hand simple Python programs. • Structure simple Python programs for solving problems. • Decompose a Python program into functions.
21150L16	Problem Solving And Python Programming Laboratory	• Write, test, and debug simple Python programs. • Implement Python programs with conditionals and loops. • Develop Python programs step-wise by defining functions and calling them. • Use Python lists, tuples, dictionaries for representing compound data. • Read and write data from/to files in Python.
21149L17	Physics And Chemistry Laboratory	• Upon completion of the course, the students will be able to apply principles of elasticity, optics and thermal properties for engineering applications • The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.
21147L18	Communication Laboratory – I	• To learn about philosophy of Life and Individual qualities • To learn and practice social values and responsibilities • To learn and practice mind culture, forces acting on the body • To learn more of Responsibilities and Rights as Professional and facing Global Challenges • Emerge as responsible citizen with clear conviction to be a role-model in the society.

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21147S21	Professional English – II	• To compare and contrast products and ideas in technical texts. • To identify and report cause and effects in events, industrial processes through technical texts 44 • To analyse problems in order to arrive at feasible solutions and communicate them in the written format. • To present their ideas and opinions in a planned and logical manner • To draft effective resumes in the context of job search.
21148S22	Statistics And Numerical Methods	• Apply the concept of testing of hypothesis for small and large samples in real life problems. • Apply the basic concepts of classifications of design of experiments in the field of agriculture. • Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems. • Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations. • Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
21149S23A	Physics For Information Science	• gain knowledge on classical and quantum electron theories, and energy band structures • acquire knowledge on basics of semiconductor physics and its applications in various devices • get knowledge on magnetic properties of materials and their applications in data storage, • have the necessary understanding on the functioning of optical materials for optoelectronics • understand the basics of quantum structures and their applications and basics of quantum computing
21154S24	Engineering Graphics	• Use BIS conventions and specifications for engineering drawing. • Construct the conic curves, involutes and cycloid. • Solve practical problems involving projection of lines. • Draw the orthographic, isometric and perspective projections of simple solids. • Draw the development of simple solids.
21153S25A	Basic Electrical And Electronics Engineering	• Compute the electric circuit parameters for simple problems • Explain the working principle and applications of

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		• electrical machines • Analyze the characteristics of analog electronic devices • Explain the basic concepts of digital electronics • Explain the operating principles of measuring instruments
21150C26	Programming In C	• Demonstrate knowledge on C Programming constructs • Develop simple applications in C using basic constructs • Design and implement applications using arrays and strings • Develop and implement modular applications in C using functions. • Develop applications in C using structures and pointers. • Design applications using sequential and random access file processing.
21154L21	Engineering Practices Laboratory	• Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work. • Wire various electrical joints in common household electrical wire work. • Weld various joints in steel plates using arc welding work; Machine various simpleprocesses like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray outof metal sheet using sheet metal work. • Solder and test simple electronic circuits; Assemble and test simple electronic components on PCB.
21150L22	Programming In C Laboratory	• Demonstrate knowledge on C programming constructs. • Develop programs in C using basic constructs. • Develop programs in C using arrays. • Develop applications in C using strings, pointers, functions. Develop applications in C using structures. • Develop applications in C using file processing
21148S31A	DiscreteMathematics	• Haveknowledgeoftheconceptsneededtotestthelogicofaprogram. • Haveanunderstandingidentifyingstructuresonmanylevels. • Beawareofaclassoffunctionswhichtransformafinitesetintoanotherfinitesetwhichrelatestoinputandoutput

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		Functions in computer science. • Be aware of the counting principles. • Be exposed to concepts and properties of • Algebraic structures such as groups,rings and fields.
21150C32	Digital Principles And System Design	• Design various combinational digital circuits using logic gates • Design sequential circuits and analyze thedesign procedures • State the fundamentals of computer system sandanalyze the execution of an instruction • Analyze different types of control design and identify hazards • Identify the characteristics of various memory systems and I/O communication
21150C33	Data Structures	• Define linear and non-linear data structures. • Implement linear and non–linear data structure operations. • Use appropriate linear/non– linear data structure operations for solving a given problem. • Apply appropriate graph algorithms for graph applications. • Analyze the various searching and sorting algorithms. .
21150C34	Object Oriented Programming	• Apply the concepts of classes and objects to solve simple problems • Develop programs using inheritance ,packages and interfaces • Make use of exception handling mechanisms and multithreaded model to sole real world problems • Build Java applications with I/O packages, string classes, Collections a nd generics concepts • Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications
21150C35	Foundations Of Data Science	• Define the data science process • Understand different types of data description for data science process

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		• Gain knowledge on relationships between data • Use the Python Libraries for Data Wrangling • Apply visualization Libraries in Python to interpret and explore data
21150L36	Data Structures Laboratory	• Implement Linear data structure algorithms • Implement applications using Stacks and Linked lists • Implement Binary Search tree and AVL tree operations. • Implement graph algorithms Analyze the various searching and sorting algorithms
21150L37	Object Oriented Programming Laboratory	• Designanddevelopjavaprogramsusingobjectorientedprogramming concepts • Develop simple applicationsusingobjectorientedconceptssuchaspackage,exceptions • Implementmultithreading,andgenericsconcepts • CreateGUIsandeventdrivenprogrammingapplicationsforrealworld problems • Implementanddeploy web applications using Java
21150L38	DATA SCIENCE LABORATORY	• Make use of the python libraries for data science • Make use of the basic Statistical and Probability measures for data science. • Perform descriptive analytics on the bench mark datasets. • Perform correlation and regression analytics on standard datasets • Present and interpret data using visualization packages in Python.
21150L39	Interpersonal Skills/Listening& Speaking	• Listen and respond appropriately. • Participate in group discussions • Make effective presentations • Participate confidently andappropriately in conversations both formal and in formal
21150C41	Theory Of Computation	• Construct automata theory using Finite Automata • Write regular expressions for any pattern

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		• Design context free grammar and Pushdown Automata • Design Turing machine for computational functions • Differentiate between decidable and undecidable problems
21150c42	Artificial Intelligence And Machine Learning	• Useappropriatesearchalgorithmsforproblemsolving • Applyreasoningunderuncertainty • Buildsupervised learning models • Build ensemblingandunsupervisedmodels • Builddeeplearningneuralnetworkmodels
21150c43	Database Management Systems	• Construct SQL Queries using relational algebra • Design database using ER mode land normalize the database • Construct queries to handletransaction processing and maintain consistencyof the database • Compare and contrast various indexing strategies and apply the knowledge to tune the performance of the database • Appraise how advanced databases differ from Relational Databases and find asuitable data base for the given requirement.
21150C44	Algorithms	• Analyze the • Efficiency of algorithms using various frameworks • Apply graph algorithms to solve problems and analyze their efficiency. • Make use of algorithm design techniques like divide and conquer, dynamic programming andgreedy techniques to solve problems • Use the states place tree method for solving problems. • Solve problems using approximation algorithms and randomized algorithms
21150C45	Introduction To Operating Systems	• Analyze various scheduling algorithms and process synchronization. • Explain deadlock prevention and avoidance algorithms. • Compare and contrast various memory management schemes. • Explain the functionality of file systems ,I/O systems , and Virtualization • Compare iOS and Android Operating Systems. • .

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21149S46	Environmental Sciences And Sustainability	• Use typical data definitions and manipulationcommands. • Design applications to test Nested and JoinQueries • Implement simple applications that use Views • Implement applications that require a Front-endTool • Critical analyze the use of Tables, Views, Functions and Procedures
21150L47	Database Management Systems Laboratory	• Create databases with different typesof key constraints • Construct simple and complex SQL querie using DML and DCL commands. • Use advanced features such as stored procedures and triggers and in corporate in GUI based application development. • Create an XML database and validate with meta-data (XML schema). • Create and manipulate data using NOSQL database.
21150L48	OPERATINGSYSTEMSLABORATORY	• Define and implement UNIX Commands. • Compare the performance of various CPU Scheduling Algorithms. • Compare and contrast various Memory Allocation Methods. • Define File Organization and File AllocationStrategies. • Implement various Disk Scheduling Algorithms.
21150C51	Compiler Design	• Apply the basic notions of groups rings. fields which will then be used to solve related problems. • Explain the fundamentalconcepts of advanced algebra and their role in modern mathematics and applied contexts. • Demonstrate accurate andefficient use of advanced algebraic techniques • Demonstrate their master by solving no retrivial problems related to the concepts,and by provings

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		• subject. Impel theorems about the, statements proven by the text. • Applyintegratedapproachtonumbertheoryandabstractalgebra,andprovi deafirmbasisfor further reading andstudyinthe
21150C52	Computer Networks	• Understand the basic layer sand • Its functions in computer networks. • Evaluate the performance of a network. Understand the basics of how dataflows from one node to another. • Analyze and design routing algorithms. • Design protocols for various functions in the network. • Understand • The working of various application layer protocols.
21150C53	CryptographyAnd Cyber Security	• Understand and execute programs based on 8086 micro processor. • Design Memory Interfacing circuits. • Design and interface I/O circuits. • Design and implement8051 microcontroller based systems • Transform UML based ssoftware design into pattern based design using design patterns • Understand the various testing methodologies for OO software
21150C54	Distributed Computing	• Write ALP Programmer for fixed andFloating Point and Arithmetic operations • Interface different I/Os with processor • Generate wav forms using Microprocessors • Execute Programs in 8051 • Explain the difference between simulator and Emulator
21150E55H	Big Data Analytics	• Describe big data and use cases from selected business domains. • Explain NoSQL big data management. Install, configure, and run Hadoop and HDFS. • Perform map-reduce analytics using Hadoop. • Use Hadoop-related tools such as Base, Cassandra, Pig, and Hive for big data analytics.
21150E56B	App Development	• Develop Native applications with GUI Components.

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		• Develop hybrid applications with basic event handling. • Implement cross-platform applications with location and data storage capabilities. • Implement cross platform applications with basic GUI and event handling. • Develop web applications with cloud database access
21147MC51A	Introduction To Women And Gender Studies	• • Students will be able to understand the relevance of literature in human life and appreciate its aspects in developing finer sensibilities.
21153OE61	Renewable Energy System	• Attained knowledge about various renewable energy technologies • Ability to understand and design a PV system. • Understand the concept of various wind energy system. • Gained knowledge about various possible hybrid energy systems • Attained knowledge about various application of renewable energy technologies
21152S62	Embedded Systems And Iot Design	• Explain the architecture of embedded processors. • Write embedded C programs. • Design simple embedded applications. • Compare the communication models in IOT • Design IoT applications using Arduino/Raspberry Pi /open platform.
21150C63	Object Oriented Software Engineering	• Compare various Software Development Lifecycle Models • Evaluate project management approaches as well as cost and schedule estimation strategies. • Perform formal analysis on specifications. • Use UML diagrams for analysis and design. • Architect and design using architectural styles and design patterns, and test the system
21150E64A	Cloud Computing	• Understand the design challenges in the cloud. • Apply the concept of virtualization and its types. • Experiment with virtualization of hardware resources and Docker. • Develop and deploy services on the cloud and set up a cloud environment. • Explain security challenges in the cloud environment.
21150E65A	Ethical Hacking	• To express knowledge on basics of computerbased vulnerabilities • To gain understanding on different foot printing, reconnaissance and scanning methods. • To demonstrate the enumeration and vulnerability analysis methods • To gain knowledge on hacking options available

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		○ in Web and wireless applications. • To acquire knowledge on the options fornetwork protection. • To use tools to perform ethical hacking to expose the vulnerabilities.
21150E66A	Augmented Reality/Virtual Reality	• Understand the basic concepts of AR and VR • Understand the tools and technologies related to AR/VR • Know the working principle of AR/VR relatedSensor devices • Design of various models using modeling techniques • Develop AR/VR applications in different domains
21150E67B	Robotic Process Automation	• Enunciate the key distinctions between RPA and existing automation techniques and platforms. • Use UiPath to design control flows and work flows for the target process • Implement recording, web scraping andprocess mining by automation • Use UIPath Studio to detect, and handle exceptions in automation processes • Implement and use Orchestrator for ○ creation, monitoring, scheduling, and controllingof automated bots and processes.
21147MC61A	Well Being With Traditional Practices (Yoga, Ayurveda And Siddha)	• Learn the importance of different components of health • Gain confidence to lead a healthy life • Learn new techniques to prevent lifestyle health disorders • Understand the importance of diet and workouts in maintaining health
21153OE72	Introduction To Control Engineering	• To represent and develop systems in different forms using the knowledge gained (L5). • To analyses the system in time and frequency domain (L4). • Ability to Derive Transfer function Model of Electrical and Mechanical Systems. (L2) • Ability to Obtain the transfer Function by the Reduction of Block diagram & Signal flow graph (L3) • To analyses the stability of physical systems(L4). • To acquire and analyses knowledge in State variable model for MIMO systems(L1)
21153OE73A	Renewable Energy Technologies(EEE)	• Discuss the Indian and global energy scenario. • Describe the various solar energy technologiesand its applications. • Explain the various wind energy technologies. • Explore the various bio-energy technologies. • Discuss the ocean and geothermal technologies.

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21153OE74A	Sensors (Eee)	• List common types of sensor and actuators used in vehicles. • Design measuring equipment's for the measurement of pressure force, temperature and flow. • Generate new ideas in designing the sensors and actuators for automotive application • Understand the operation of the sensors, actuators and electronic control. • Design temperature control actuators for vehicles
21160E75A	Principles Of Management	• Upon completion of the course, students will beable to have clear understanding of • managerial functions like planning, organizing, staffing, leading & controlling. • Have same basic knowledge on internationalaspect of management. • Ability to understand management concept of organizing. • Ability to understand management concept of directing.
21150INT76	Summer Internship	• Ability to understand management concept of organizing. • Ability to understand management concept ofdirecting
2148S11 P	Transforms and partial differential equations	• Solve Simple Second Order Differential Equations; • Be Able To Calculate Fourier Series; • Prove The Orthogonality Of Eigen functions Of Boundary Value Problems; • Be Able To Classify Second Order Partial Differential Equations And Choose The Appropriate Boundary Conditions; • Apply The Method Of Separation Of Variables To Standard Pdes; • Understand The Wide Applications Of Differential Equation; • Use Laplace Transforms To Solve Simple Linear Differential Equations.

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COURSE CODE	COURSE TITLE	COURSE OUTCOMES	PO												PSO		
			1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
21147S11	PROFESSIONAL ENGLISH - I	To use appropriate words in a professional context	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
		To gain understanding of basic grammatical structures and use them in right context.	1	1	1	1		3	3	3	1	3	-	3	-	-	-
		To read and infer the denotative and connotative meanings of technical texts	2	3	2	3		3	3	3	2	3	3	3	-	-	-
		To read and interpret information presented in tables, charts and other graphic forms	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
		To write definitions, descriptions, narrations and essays on various topics	2	3	3	3		3	3	3	2	3	-	3	-	-	-
		AVg.	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	**-**	**-**	**-**
21148S12	MATRICES AND CALCULUS	Use the matrix algebra methods for solving practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Apply differential calculus tools in solving various application problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Able to use differential calculus ideas on several variable functions.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-

		Apply different methods of integration in solving practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Apply multiple integral ideas in solving areas, volumes and other practical problems	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		Avg	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
21149S 13	**ENGINEERING PHYSICS**	Understand the importance of mechanics.	3	3	2	1	1	1		-	-	-	-	-	-	-	-
		Express their knowledge in electromagnetic waves.	3	3	2	1	2	1		-	-	-	-	-	-	-	-
		Demonstrate a strong foundational knowledge in oscillations, optics and lasers.	3	3	2	2	2	1		-	-	-	-	1	-	-	-
		Understand the importance of quantum physics.	3	3	1	1	2	1		-	-	-	-	-	-	-	
		Comprehend and apply quantum mechanical principles towards the formation of energy bands.	3	3	1	1	2	1		-	-	-	-	-	-	-	-
		AVG	3	3	1.6	1.2	1.8	1		-	-	-	-	1	-	-	-
21149S 14	**ENGINEERING CHEMISTRY**	To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	3	2	2	1	-	1		-	-	-	-	1	-	-	-
		To identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.	2	-	-	1	-			-	-	-	-	-	-	-	-

		To apply the knowledge of phase rule and composites for material selection requirements.	3	1	-	-	-	-		-	-	-	-	-	-	-	-
		To recommend suitable fuels for engineering processes and applications.	3	1	1	-	-	1		-	-	-	-	-	-	-	-
		To recognize different forms of energy resources and apply them for suitable applications in energy sectors.	3	1	2	1	-			-	-	-	-	2	-	-	-
		Avg.	**2.8**	**1.3**	**1.6**	**1**	**-**	**.5**	**.8**	**-**		**-**	**-**	**1.5**	**-**	**-**	**-**
21150S15	**PROBLEM SOLVING AND PYTHON PROGRAMMING**	Develop algorithmic solutions to simple computational problems	3	3		3	2			-	-	-	2	2	3		3
		Develop and execute simple Python programs.	3	3		3	2			-	-	-	2	2	3		-
		Write simple Python programs using conditionals and looping for solving problems.	3	3		3	2			-	-	-	2	-	3		-
		Decompose a Python program into functions	2	2		2	2			-	-	-	1	-	3		-
		Represent compound data using Python lists, tuples, dictionaries etc	1	2			1			-	-	-	1	-	2		-
		AVg.	2	2			2			-	-	-	1	-	2		-
21150L16	**PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY**	On completion of the course, students will be able to:	3	3	3	3	3	-		-	-	-	3	2	3	3	-
		Develop algorithmic solutions to simple computational problems Develop and execute simple Python programs.	3	3	3	3	3	-		-	-	-	3	2	3	-	-
		Implement programs in Python using conditionals and loops for solving problems.	3	3	3	3	2	-		-	-	-	2	-	3	-	-

		Deploy functions to decompose a Python program.	3	2	-	2	2	-		-	-	-	1	-	3	-	-
		Process compound data using Python data structures.	1	2	-		1	-		-	-	-	1	-	2	-	-
		Process Value data using Python data structures.	2	-	-		2	-		-	-	-	1	-	2	-	-
		AVg.	**2**	**3**	**3**	**3**	**2**	-		-	-	-	**2**	**2**	**3**	**3**	-
21149L17	**PHYSICS AND CHEMISTRY LABORATORY**	Understand the functioning of various physics laboratory equipment.	3	2	3	1	1	-	-	-		-	-	-	-	-	-
		Use graphical models to analyze laboratory data.	3	3	2	1	1	-	-	-		-	-	-	-	-	-
		Use mathematical models as a medium for quantitative reasoning and describing physical reality.	3	2	3	1	1	-	-	-		-	-	-	-	-	-
		Access, process and analyze scientific information.	3	3	2	1	1	-	-	-		-	-	-	-	-	-
		Solve problems	3	2	3	1	1	-	-	-		-	-	-	-	-	-
		AVG	3	2.4	2.6	1	1										
21147L18	**COMMUNICATION LABORATORY- I**	To listen to and comprehend general as well as complex academic information	3	3	3	3	1	3	3	3		3	3	3	-	-	
		To listen to and understand different points of view in a discussion	3	3	3	3	1	3	3	3		3	3	3	-	-	
		To speak fluently and accurately in formal and informal communicative contexts	3	3	3	3	1	3	3	3		3	3	3	-	-	

		To describe products and processes and explain their uses and purposes clearly and accurately	3	3	3	3	1	3	3	3		3	3	3	-	-			
		To express their opinions effectively in both formal and informal discussions	3	3	3	3	1	3	3	3		3	3	3	-	-			
		AVg.	**3**	**3**	**3**	**3**	**1**	**3**	**3**	**3**		**3**	**3**	**3**	-	-			
21147S 21	**PROFESSIONAL ENGLISH - II**	To compare and contrast products and ideas in technical texts.	3	3		3	3	3	3	3		3	3	3	-	-	-		
		To identify and report cause and effects in events, industrial processes through technical texts	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-		
		To analyse problems in order to arrive at feasible solutions and communicate them in the written format.	3	3		3	3	3	3	3	2	3	3	3	-	-	-		
		To present their ideas and opinions in a planned and logical manner	3	3		3	2	3	3	3		3	3	3	-	-	-		
		To draft effective resumes in the context of job search.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**3**	**3**	**3**	**-**	**-**	**-**		
		AVg.	**3**	**3**		**3**	**2.75**	**3**	**3**	**3**	**.2**	**3**	**3**	**3**	**-**	**-**	**-**		
21148S 22	**STATISTICS AND NUMERICAL METHODS**	Apply the concept of testing of hypothesis for small and large samples in real life problems.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-		
		Apply the basic concepts of classifications of design of experiments in the field of agriculture.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-		

		Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Avg	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
21149S 23A	**PHYSICS FOR INFORMATION SCIENCE**	Gain knowledge on classical and quantum electron theories, and energy band structures	3	1	-	-	-	-	-	-		-	-	-	-	-	-
		Acquire knowledge on basics of semiconductor physics and its applications in various devices	3	1	2	-	-	-	-	-		-	-	-	-	-	-
		Get knowledge on magnetic properties of materials and their applications in data storage,	3	-	-	1	2	1	1	-		-	-	-	-	-	-
		Have the necessary understanding on the functioning of optical materials for optoelectronics	3	-	2	1	3	-	1	-		-	-	-	-	-	-
		understand the basics of quantum structures and their applications and basics of quantum computing	3	2	2	2	2	1	2	-		-	-	2	-	-	-
		Avg	3	1.3	2	1.3	2.3	1	1.3	-		-	-	2	-	-	-
21149S 23D	**MATERIALS SCIENCE**	know basics of crystallography and its importance for varied materials properties	3	2	1	2	1	1		-	-	-	-	-	-	-	-
		gain knowledge on the electrical and magnetic properties of materials and their applications	3	2	1	1	2	1		-	-	-	-	-	-	-	-
		understand clearly of semiconductor physics and functioning of semiconductor devices	3	2	2	2	2	1		-	-	-	-	-	-	-	-

		understand the optical properties of materials and working principles of various optical devices	3	2	2	1	2	2		-	-	-	-	1	-	-	-
		appreciate the importance of functional nanoelectronic devices.	3	2	2	1	2	1		-	-	-	-	-	-	-	-
		AVG	3	2	1.6	1.4	1.8	1.2		-	-	-	-	1	-	-	-
21153S25A	**BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**	Compute the electric circuit parameters for simple problems	2	2	1	-	-	-	-	1	-	-	-	2	-	-	1
		Explain the working principle and applications of electrical machines	2	2	1	-	-	-	-	1	-	-	-	2	-	-	1
		Analyze the characteristics of analog electronic devices	2	1	1	-	-	-	-	1	-	-	-	2	-	-	1
		Explain the basic concepts of digital electronics	2	2	1	-	-	-	-	1	-	-	-	2	-	-	1
		Explain the operating principles of measuring instruments	2	2	1	-	-	-	-	1	-	-	-	2	-	-	1
		CO/PO & PSO Average	2	1.8	1	-	-	-	-	1	-	-	-	2	-	-	1
21154S24	**ENGINEERING GRAPHICS**	Use BIS conventions and specifications for engineering drawing.	3	1	2		2					3		2	2	2	
		Construct the conic curves, involutes and cycloid.	3	1	2		2					3		2	2	2	
		Solve practical problems involving projection of lines.	3	1	2		2					3		2	2	2	
		Draw the orthographic, isometric and perspective projections of simple solids.	3	1	2		2					3		2	2	2	

		Draw the development of simple solids.	3	1	2		2					3		2	2	2	
		Avg.	3	1	2		2					3		2	2	2	
21154L27	**ENGINEERING PRACTICES LABORATORY**	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.	3	2			1	1	1					2	2	1	1
		Wire various electrical joints in common household electrical wire work.	3	2			1	1	1					2	2	1	1
		Weld various joints in steel plates using arc welding work; Machine various simple processeslike turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.	3	2			1	1	1					2	2	1	1
		Avg.	3	2			1	1	1					2	2	1	1
21153L28C	**PROGRAMMING IN C LABORATORY**	Demonstrate knowledge on C Programming constructs	1	2	2	1	2	1	1	1	2	-	3	2	1	2	-
		Develop simple application in C using basic Constructs	2	2	2	1	2	1	1	1	2	-	3	3	2	2	-
		Design and implement applications using arrays and strings	2	3	2	1	2	1	1	1	2	-	3	2	2	2	-
		Develop and implement modular applications in C using functions.	3	2	2	1	3	1	1	1	2	-	3	3	2	2	-
		Develop applications in C using structures and pointers.	2	3	3	1	2	1	2	1	2	-	3	2	2	3	-

		Design applications using sequential and random access file processing.	2	2	3	2	1	2	-	-	2	1	2	2	2	2	
		Avg	**2**	**2**	**2**	**1**	**2**	**1**	**1**	**1**	**2**	**-**	**3**	**2**	**2**	**2**	-
21147L29	**COMMUNICATION LABORATORY – II**	Speak effectively in group discussions held in ~~a~~ formal/semi formal contexts.	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
		Discuss, analyse and present concepts and problems from various perspectives to arrive atsuitable solutions	2	3	3	3	1	3	3	3	3	3	3	3	-	-	-
		Write emails, letters and effective job applications.	2	2	3	3	1	3	3	3	3	3	3	3	-	-	-
		Write critical reports to convey data and information with clarity and precision	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
		Give appropriate instructions and recommendations for safe execution of tasks	3	3	3	3	3	3	3	3	3	3	3	3	-	-	-
		Avg	**2.4**	**2.8**	**3**	**3**		**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**	**-**	**-**
21148S31A	**DISCRETE MATHEMATICS**	Have knowledge of the concepts needed to test the logic of a program.	3	3	2	-	-	-	-	-	-	-	-	2	-	-	-
		Have an understanding in identifying structures on many levels.	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-
		Be aware of a class of functions which transform a finite set into another finite set whichrelates to input and output functions in computer science.	-	3	2	-	-	2	-	-	-	3	-	-	-	-	-
		Be aware of the counting principles.	-	2	2	2	-	-	-	-	-	-	-	-	-	-	-

		Be exposed to concepts and properties of algebraic structures such as groups, rings andfields.	-	2	2	2	-	-	-	-	-	2	-	-	-	-	-
		Avg	**1**	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**
21150C32	**DIGITAL PRINCIPLES AND COMPUTER ORGANIZATION**	Design various combinational digital circuits using logic gates	3	3	3	3	3	2	1	1		1	2	3	2	3	3
		Design sequential circuits and analyze the design procedures	3	3	3	3	2	1	1	1		1	2	3	1	2	2
		State the fundamentals of computer systems and analyze the execution of an instruction	3	3	3	3	2	2	1	1		1	2	3	2	3	1
		Analyze different types of control design and identify hazards	3	3	3	3	1	1	1	1		1	1	2	1	3	1
		Identify the characteristics of various memory systems and I/O communication	3	3	3	3	1	2	1	1		1	1	2	1	2	1
		Avg	3	3	3	3	1.8	1.6	1	1		1	1.6	2.6	1.4	2.6	1.6
21150C33	**DATA STRUCTURES**	Define linear and non-linear data structures.	2	3		2	2	1	1	-		2	1	3	2	1	3
		Implement linear and non–linear data structure operations.	1	2		2	2	-	-	-		1	1	2	2	2	2
		Use appropriate linear/non–linear data structure operations for solving a given problem.	2	3		2	3	-	-	-		1	1	2	2	1	2

		Apply appropriate graph algorithms for graph applications.	2	1		1	1	-	-	-		1	1	2	2	3	
		Analyze the various searching and sorting algorithms.	1	2		2	2	1	1	-		2	1	3	2	2	
		Avg	2	2		2	2	1	1	-		1	1	2	2	2	
21150C34	OBJECT ORIENTED PROGRAMMING	Apply the concepts of classes and objects to solve simple problems	1	1	3	1	3	-	-	-		2	2	2	3	1	2
		Develop programs using inheritance, packages and interfaces	2	1	3	2	1	-	-	-		1	1	3	3	3	2
		Make use of exception handling mechanisms and multithreaded model to solve real world problems	3	3	1	2	2	-	-	-		2	1	2	3	1	3
		Build Java applications with I/O packages, string classes, Collections and generics concepts	3	1	2	2	2	-	-	-		2	1	3	3	1	1
		Integrate the concepts of event handling and JavaFX components and controls for developing GUI based applications	1	1	2	3	2	-	-	-		2	1	2	3	3	3
		Avg	2	1	2	2	2	-	-	-		2	1	2	3	2	2
21150C35	FOUNDATIONS OF DATA SCIENCE	Define the Data Science Process	2	2		2	2	-	-	-		1	1	2	2	2	
		Understand different types of data description for data science process	2	1		1	1	-	-	-		1	1	2	2	3	
		Gain knowledge on relationships between data	2	2		2	2	1	1	-		2	1	3	2	2	

		Use the Python Libraries for Data Wrangling	3	2		1	2	-	-	-		1	2	2	3	3	
		Apply visualization Libraries in Python to interpret and explore data	2	2		2	2	-	-	-		1	1	2	2	2	
		Avg	2	2		2	2	1	1	-		1	1	2	2	2	
21150L36	DATA STRUCTURES LABORATORY	Implementg the Linear Data structure algorithms	1	2	2	1	-	-	-	-		1	2	2	2	2	3
		Implement applications using Stacks and Linked lists	3	3	1	1	-	-	-	-		1	1	3	1	2	2
		Implement Binary Search tree and AVL tree operations.	2	1	3	1	-	-	-	-		1	2	3	3	3	3
		Implement graph algorithms	3	1	3	3	-	-	-	-		2	3	3	2	1	2
		Analyze the various searching and sorting algorithms.	3	2	1	1	2	-	-	-		3	3	1	3	1	3
		Avg	2	2	2	1	2	-	-	-	2	2	2	2	2	2	3
21150L37	OBJECT ORIENTED PROGRAMMING LABORATORY	Design and develop java programs using object oriented programming concepts	2	1	2	1	-	-	-	-		2	2	2	1	2	3
		Develop simple applications using object oriented concepts such as package, exceptions	2	1	3	1	-	-	-	-		3	3	2	1	3	1
		Implement multithreading, and generics concepts	2	2	1	2	1	-	-	-		2	1	3	2	3	2
		Create GUIs and event driven programming applications for real world problems	2	2	1	3	-	-	-	-		1	1	1	2	1	2
		Implement and deploy web applications using Java	1	3	3	1	3	-	-	-		1	1	1	2	1	2
		Avg	2	2	2	2	2	-	-	-		2	2	2	2	2	2

21150L38	DATA SCIENCE LABORATORY	Make use of the python libraries for data science	3	2	1	1	-	-	-	-		3	3	3	1	3	2
		Make use of the basic Statistical and Probability measures for data science.	3	2	2	3	1	-	-	-		1	3	2	1	3	3
		Perform descriptive analytics on the benchmark data sets.	3	2	1	3	1	-	-	-		1	1	1	3	2	3
		Perform correlation and regression analytics on standard data sets	2	3	1	3	-	-	-	-		3	2	3	3	3	1
		Present and interpret data using visualization packages in Python.	1	2	3	1	1	-	-	-		1	3	1	1	3	3
		Avg	2	2	2	2	1	-	-	-		2	2	2	2	3	2
21150L39	PROFESSIONAL DEVELOPMENT	Use MS Word to create quality documents, by structuring and organizing content for their dayto day technical and academic requirements															
		Use MS EXCEL to perform data operations and analytics, record, retrieve data as perrequirements and visualize data for ease of understanding.															
		Use MS PowerPoint to create high quality academic presentations by including commontables, charts, graphs, interlinking other elements, and using media objects.															
21150C41	THEORY OF COMPUTATION	Construct automata theory using Finite Automata.	1	3	2	3	-	-	-	-		1	2	3	1	3	2
		Write regular expressions for any pattern.	2	2	3	2	1	-	-	-		3	2	3	3	1	2
		Design context free grammar and Pushdown Automata	2	2	3	2	1	-	-	-		3	1	2	1	2	2
		Design Turing machine for computational functions.	2	2	2	1	-	-	-	-		3	3	2	1	3	2
		Differentiate between decidable and undecidable problems.	2	2	2	1	1	-	-	-		1	3	2	3	1	3
		Avg	2	2	2	2	1	-	-	-		2	2	2	2	2	2

21150C42	ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING	Use appropriate search algorithms for problem solving	3	2	3	3	-	-	-	-		3	3	3	1	2	2
		Apply reasoning under uncertainty	1	1	1	3	1	-	-	-		2	1	3	2	3	2
		Build supervised learning models.	2	1	2	1	1	-	-	-		1	1	3	1	1	1
		Build ensembling and unsupervised models.	3	1	3	1	-	-	-	-		1	2	1	2	2	2
		Build deep learning neural network models	3	1	1	2	2	-	-	-		1	2	3	2	1	2
		Avg	2	1	2	2	1	-	-	-		2	2	3	2	2	2
21150C43	DATABASE MANAGEMENT SYSTEMS	Construct SQL Queries using the Relational algebra	2	2	3	2	1	-	-	-		1	1	1	2	1	3
		Design database using ER model and normalize the database	3	1	1	1	1	-	-	-		3	3	3	3	1	2
		Construct queries to handle transaction processing and maintain consistency of thedatabase	3	2	3	2	1	-	-	-		1	1	2	2	3	3
		Compare and contrast various indexing strategies and apply the knowledge to tune theperformance of the database.	1	2	3	2	-	-	-	-		2	3	3	1	2	3
		Appraise how advanced databases differ from Relational Databases and find a suitabledatabase for the given requirement.	1	1	3	3	2	-	-	-		3	3	1	2	2	2
		Avg	2	2	3	2	1	-	-	-		2	2	2	2	2	3
21150C44	ALGORITHMS	Analyze the efficiency of algorithms using various frameworks	3	2		-	-		1	-	-	-	-	1	-	1	-
		Apply graph algorithms to solve problems and analyze their efficiency.	2	3		-	-		1	-	-	-	-	1	-	1	-
		Make use of algorithm design techniques like divide and conquer, dynamic programmingand greedy techniques to solve problems	1	2		1	-		2	-	-	-	-	-	-	1	1
		Use the state space tree method for solving problems	1	1		-	-		-	-	-	-	-	-	-	-	-
		Solve problems using approximation algorithms and randomized algorithms	1	1		-	-		-	-	-	-	-	-	-	-	-

		Avg	2.67	1.8		1	-		1.33	-	-	-	-	1	-	1	1
21150C45	**INTRODUCTION TO OPERATING SYSTEMS**	Analyze various scheduling algorithms and process synchronization.	3	1	2	2	-	-	-	-		2	3	1	1	2	
		Explain deadlock prevention and avoidance algorithms.	2	2	3	1	1	-	-	-		1	1	2	2	1	
		Compare and contrast various memory management schemes.	1	3	2	2	1	-	-	-		2	1	1	1	2	
		Explain the functionality of file systems, I/O systems, and Virtualization	1	3	3	3	-	-	-	-		2	1	2	1	3	
		Compare iOS and Android Operating Systems.	3	1	2	1	1	-	-	-		2	3	2	2	2	
		Avg	2	2	2	2	1	-	-	-		2	2	2	1	2	
21149S46	**ENVIRONMENTAL SCIENCES AND SUSTAINABILITY**	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.	2	1	-			2	3	-	-	-	-	2	-	-	-
		To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	3	2	-			3	3	-		-	-	2	-	-	-
		To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	3	-	1			2	2	-		-	-	2	-	-	-
		To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.	3	2				2	2	-	-	-	-	2	-	-	-
		To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	3	2				2	2	-		-	-	1	-	-	-
		Avg.	**2.8**	**1**				**2**	**2**	**-**	**-**	**-**	**-**	**1.8**	**-**	**-**	**-**

				.8				.2	.4									
21150L47	DATABASE MANAGEMENT SYSTEMS LABORATORY	Create databases with different types of key constraints	3	3	3	3	-	-	-	-		1	3	2	2	3	2
		Construct simple and complex SQL queries using DML and DCL commands.	2	2	3	2	2	-	-	-		2	3	3	2	1	2
		Use advanced features such as stored procedures and triggers and incorporate in GUI basedapplication development.	3	3	2	1	1	-	-	-		1	1	3	2	3	3
		Create an XML database and validate with meta-data (XML schema).	1	3	3	3	1	-	-	-		1	3	2	3	1	3
		Create and manipulate data using NOSQL database.	3	2	1	1	1	-	-	-		2	3	1	3	1	2
		Avg	2	3	2	2	1	-	-	-		1	3	2	2	2	2
21150L48	OPERATING SYSTEMS LABORATORY	Define and implement UNIX Commands	3	1	3	1	1	-	-	-		3	3	3	2	1	3
		Compare the performance of various CPU Scheduling Algorithms.	3	1	1	2	2	-	-	-		2	1	1	3	1	2
		Compare and contrast various Memory Allocation methods.	3	3	2	1	2	-	-	-		3	1	2	2	2	2
		Define File Organization and File Allocation Strategies.	1	2	2	3	2	-	-	-		1	3	1	1	2	1
		Implement various Disk Scheduling Algorithms.	2	2	1	1	3	-	-	-		2	2	3	1	3	3
		Avg	2	2	2	2	2	-	-	-		2	2	2	2	2	2
		Understand the techniques in different phases of a compiler.	3	3	3	3	-	-	-	-	3	3	1	3	2	3	2
		Design a lexical analyser for a sample language and learn to use the LEX tool.	3	3	3	3	3	-	-	-	3	2	3	2	2	1	2

21150C51	**COMPILER DESIGN**	Apply different parsing algorithms to develop a parser and learn to use YACC tool	3	3	2	2	3	-	-	-	3	1	1	1	2	2	3
		Understand semantics rules (SDT), intermediate code generation and run-time environment	3	2	2	1	1	-	-	-	2	3	2	3	1	2	1
		Implement code generation and apply code optimization techniques.	3	3	3	2	1	-	-	-	2	1	1	3	2	1	2
		Avg	**3.00**	**2.80**	**2.60**	**2.20**	**2.00**	-	-	-	**2.60**	**2.00**	**1.60**	**2.40**	**1.80**	**1.80**	**2.00**
21150C52	**COMPUTER NETWORKS**	Explain the basic layers and its functions in computer networks.	-	2		-		-	-	-		-	-	-	3	-	-
		Understand the basics of how data flows from one node to another.	-	1		-	2	-	-	-		-	-	2	-	2	-
		Analyze routing algorithms.	-	2		-	3	-	-	-		-	-	-	-	3	-
		Describe protocols for various functions in the network.	-			1	2	-	-	-		3	-	-	-	-	-
		Analyze the working of various application layer protocols.	-	3		-	-	-	-	-		-	-	-	-	-	3
		Avg	-	1		-	1	-	-	-		1	-	-	-	1	1
21150C53	**CRYPTOGRAPHY AND CYBER SECURITY**	Understand the fundamentals of networks security, security architecture, threats andvulnerabilities	3	2	**1**	2	2	-	-	-		-	-	1	2	3	3
		Apply the different cryptographic operations of symmetric cryptographic algorithms	3	3	3	3	3	-	-	-		-	-	1	3	3	3
		Apply the different cryptographic operations of public key cryptography	3	3	3	3	3	-	-	-		-	-	1	3	3	3
		Apply the various uthentication schemes to simulate different applications.	3	3	3	3	3	-	-	-		-	-	1	3	3	3
		Understand various cyber crimes and cyber security	3	2	3	2	3	-	-	-		-	-	2	**3**	2	3

		Avg	**3**	**2.6**	**2.6**	**2.6**	**2.8**	**-**	**-**	**-**		**-**	**-**	**1.2**	**2.8**	**2.8**		**3**
21150C54	**DISTRIBUTED COMPUTING**	Explain the foundations of distributed systems (K2)	2	2	3	3	1	-	-	-	2	1	3	3	2	1	1	
		Solve synchronization and state consistency problems (K3)	1	3	2	1	2	-	-	-	2	2	2	2	1	3	2	
		Use resource sharing techniques in distributed systems (K3)	2	2	1	3	3	-	-	-	3	2	1	1	1	2	1	
		Apply working model of consensus and reliability of distributed systems (K3)	1	2	2	3	1	-	-	-	3	3	2	1	3	1	1	
		Explain the fundamentals of cloud computing (K2)	3	3	1	2	3	-	-	-	3	3	3	1	3	2	3	
		Avg	1.8	2.4	1.8	2.4	2	-	-	-	2.6	2.2	2.2	1.6	2	1.8	1.6	
21150E55E	**BUSINESS ANALYTICS**	Explain the real world business problems and model with analytical solutions	2	2	3	1	1	-	-	-	1	2	1	1	3	2	1	
		Identify the business processes for extracting Business Intelligence	3	3	3	2	3	-	-	-	1	2	2	2	3	1	2	
		Apply predictive analytics for business fore-casting	2	2	3	3	2	-	-	-	3	1	1	3	3	1	2	
		Apply analytics for supply chain and logistics management	2	1	1	2	2	-	-	-	3	3	2	1	1	3	1	
		Use analytics for marketing and sales.	2	3	2	3	2	-	-	-	3	3	1	3	3	1	1	
		Avg	2.2	2.2	2.4	2.2	2	-	-	-	2.2	2.2	1.4	2	2.6	1.6	1.4	

21150E56H	**PRINCIPLES OF PROGRAMMING LANGUAGES**	Describe syntax and semantics of programming languages	2	2	3	2	1	-	-	-		-	-	3	2	3	-
		Explain data, data types, and basic statements of programming languages	3	3	3	2	2	-	-	-		-	-	3	2	3	-
		Design and implement subprogram constructs	3	3	3	2	2	-	-	-		-	-	3	2	3	-
		Apply object-oriented, concurrency, and event handling programming constructsand Develop programs in Scheme, ML, and Prolog	3	3	3	3	2	2	-	-		-	-	-	3	2	-
		Understand and adopt new programming languages	3	3	3	3	3	3	2	2		3	1	3	3	3	-
		Avg	**2.8**	**2.8**	**3**	**2.4**	**2**	**2.5**	**2**	**2**		**3**	**1**	**3**	**2.4**	**2.8**	-
21147MC51D	**DISASTER MANAGEMENT**	To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction(DRR)	3	3	2	3	-	-	2	2	-	-	2	-	2	-	1
		To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessmentprevention and risk reduction	3	3	3	3	-	-	2	1	-	-	2	-	2	-	1
		To develop disaster response skills by adopting relevant tools and technology	3	3	3	3	-	-	2	2	-	-	-	-	2	-	1
		Enhance awareness of institutional processes for Disaster response in the country and	3	3	2	3	-	-	2	1	-	-	2	-	2	-	1
		Develop rudimentary ability to respond to their surroundings with potential Disaster responsein areas where they live, with due sensitivity	3	3	2	3	-	-	2	2	-	-	2	-	3	-	1
		Avg	3	3	3	3	-	-	2	2	-	-	2	-	2	-	1

21153OE61	**RENEWABLE ENERGY SYSTEM**	Twidell & Wier,'Renewable Energy Resources' CRC Press(Taylor & Francis).	3	-	-	-	-	-	-	-	-	-	-	2	3	3	3
		Tiwari and Ghosal/ Narosa,'Renewable energy resources'.	3	2	-	-	-	-	-	-	-	-	-	2	3	3	3
		D.P.Kothari, K.C.Singhal,'Renewable energy sources and emerging technologies', P.H.I.	3	2	-	-	-	-	-	-	-	-	-	2	3	3	3
		D.S.Chauhan, S.K. Srivastava, 'Non – Conventional Energy Resources', New AgePublishers, 2006.	3	2	-	-	-	-	-	-	-	-	-	2	3	3	3
		B.H.Khan, 'Non – Conventional Energy Resources', Tata Mc Graw Hill, 2006	3	2	-	-	-	-	-	-	-	-	-	2	3	3	3
		Avg	3	2	-	-	-	-	-	-	-	-	-	2	3	3	3
21152S62	**EMBEDDED SYSTEMS AND IOT DESIGN**	Explain the architecture of embedded processors.	3	3	3	3	-	-	-	-		2	3	3	2	1	3
		Write embedded C programs.	2	1	3	2	2	-	-	-		2	2	3	3	1	3
		Design simple embedded applications.	3	1	3	3	1	-	-	-		2	1	1	1	3	3
		Compare the communication models in IOT	3	2	3	2	1	-	-	-		2	2	3	2	2	1
		Design IoT applications using Arduino/Raspberry Pi /open platform.	2	3	3	2	2	-	-	-		3	3	2	3	1	3
		Avg	2.6	2	3	2.4	1.5	-	-	-		2.2	2.2	2.4	2.2	1.6	2.6

21150C63	**OBJECT ORIENTED SOFTWARE ENGINEERING**	Compare various Software Development Lifecycle Models	2	2		2	2	-	-	-		1	1	2		2	2	
		Evaluate project management approaches as well as cost and schedule estimationstrategies	2	3		3	2	-	-	-		2	3	2		3	2	
		Perform formal analysis on specifications.	2	3		1	1	-	-	-		2	3	2		2	3	
		Use UML diagrams for analysis and design.	2	3		2	3	-	-	-		2	3	2		2	3	
		Architect and design using architectural styles and design patterns, and test the system	2	3		2	2	-	-	-		-	-	1		3	2	
		Avg	**2**	**2**		**2**	**2**	**-**	**-**	**-**		**1**	**1**	**2**		**2**	**2**	
21150E64A	**CLOUD COMPUTING**	Understand the design challenges in the cloud.	3	2	1	1	1	-	-	-	2	3	1	3	2	1	3	
		Apply the concept of virtualization and its types.	3	1	2	2	1	-	-	-	1	2	1	3	2	2	1	
		Experiment with virtualization of hardware resources and Docker.	2	3	2	3	1	-	-	-	3	1	1	3	1	1	1	
		Develop and deploy services on the cloud and set up a cloud environment.	1	2	3	3	3	-	-	-	3	3	1	2	1	3	3	
		Explain security challenges in the cloud environment.	2	3	3	1	3	-	-	-	2	2	1	2	2	2	3	
		Avg	2.2	2.2	2.2	2	1.8	-	-	-	2.2	2.2	1	2.6	1.6	1.8	2.2	
21150E65G	**NETWORK SECURITY**	Classify the encryption techniques	3	3	2	2	2	-	-	-	2	1	2	1	2	3	1	
		Illustrate the key management technique and authentication.	1	1	3	2	2	-	-	-	2	2	1	1	3	1	2	

		Evaluate the security techniques applied to network and transport layer	1	2	1	1	2	-	-	-	3	3	1	3	2	1	3
		Discuss the application layer security standards.	2	2	3	2	3	-	-	-	3	3	2	1	2	1	3
		Apply security practices for real time applications.	2	1	3	2	2	-	-	-	2	1	1	3	2	1	1
		Avg	1.8	1.8	2.4	1.8	2.2	-	-	-	2.4	2	1.4	1.8	2.2	1.4	2
21150E66B	MULTIMEDIA AND ANIMATION	Get the bigger picture of the context of Multimedia and its applications	3	2	3	2				-	3	2	1	2	3	2	3
		Use the different types of media elements of different formats on content pages	3	3	3	3				-	3	3	2	2	3	2	3
		Author 2D and 3D creative and interactive presentations for different target multimediaapplications.	3	3	3	3				-	3	3	2	3	3	2	3
		Use different standard animation techniques for 2D, 21/2 D, 3D applications	3	3	3	3	3	2		-	3	3	3	3	3	3	3
		Understand the complexity of multimedia applications in the context of cloud, security,bigdata streaming, social networking, CBIR etc.,	3	3	3	3	3	2		-	3	3	3	3	3	3	3
		Avg	3.00	2.80	3.00	2.80	3.00	2.00		-	3.00	2.80	2.20	2.60	3.000	2.40	3.00

21150E67D	**CYBER SECURITY**	Explain the basics of cyber security, cyber crime and cyber law (K2)	1	1	1	1	-	1	-	-		-	1	-	2	2	2
		Classify various types of attacks and learn the tools to launch the attacks (K2)	1	3	1	3	2	1	-	-		-	-	-	2	2	1
		Apply various tools to perform information gathering (K3)	2	1	1	1	-	1	-	-		-	1	-	2	2	2
		Apply intrusion techniques to detect intrusion (K3)	3	3	2	2	2	1	-	-		-	-	-	2	2	3
		Apply intrusion prevention techniques to prevent intrusion (K3)	3	2	1	1	1	1	-	1		-	1	-	2	2	2
		Avg	2	2	1.2	1.6	1	1	0	0.2		0	0.6	0	2	2	2
21147MC61E	**INDUSTRIAL SAFETY**	Understand the basic concept of safety	3	3	3	1	1	3	2	2	3	3	1	3	3	3	3
		Obtain knowledge of Statutory Regulations and standards	2	3	2	2	1	3	2	3	3	2	1	3	3	3	3
		Know about the safety Activities of the Working Place.	2	2	2	2	1	2	2	2	3	2	1	2	3	3	3
		Analyze on the impact of Occupational Exposures and their Remedies	3	3	3	2	2	3	2	2	3	2	1	3	3	3	3
		Obtain knowledge of Risk Assessment Techniques.	3	2	3	2	2	3	2	2	3	2	2	3	3	3	3
		Avg	3	3	3	2	1	3	2	2	3	2	1	3	3	3	3
21147S71	**HUMAN VALUES AND ETHICS**	Identify the importance of democratic, secular and scientific values in harmonious functioning of social life															

		Practice democratic and scientific values in both their personal and professional life.															
		Find rational solutions to social problems.															
		Behave in an ethical manner in society															
		Practice critical thinking and the pursuit of truth															
21160E 75A	**PRINCIPLES OF MANAGEMENT**	Upon completion of the course, students will be able to have clear understanding ofmanagerial functions like planning, organizing, staffing, leading & controlling.	3			-	-		-	-	-	-	-	-	2	1	1
		Have same basic knowledge on international aspect of management.	-	1		-	-		-	-	-	-	-	-	2	1	-
		Ability to understand management concept of organizing.	1			2	-		1	-	2	-	1	1	-	-	2
		Ability to understand management concept of directing.	-	1		1	2		-	1	2	-	-	-	1	1	1
		Ability to understand management concept of controlling.	1			-	1		-	-	-	3	-	1	1	-	1
		Avg	1.66	1		1.5	1.5		1	1	2	3	1	1	1.5	1	1.25
		Expand their vocabulary and gain practical techniques to read and comprehend a wide rangeof texts with the emphasis required	1	3	3	1	3	3	3	3		3	1	3	-	-	
		Identify errors with precision and write with clarity and	2	3	3	2	3	3	3	3		3	3	3	-	-	

21147OE73A	**ENGLISH FOR COMPETITIVE EXAMINATIONS**	coherence																
		Understand the importance of task fulfilment and the usage of task-appropriate vocabulary	3	3	3	3	3	3	3	3		3	3	3	-	-		
		Communicate effectively in group discussions, presentations and interviews	2	2	2	2	2	2	2	2		3	3	3	-	-		
		Write topic based essays with precision and accuracy	2	2	2	2	2	2	2	2		3	2	3	-	-		
		Avg	**2**	**2.6**	**2.6**	**2**	**2.6**	**2**	**2**	**2.6**		**3**	**2.4**	**3**	**-**	**-**		
21155OE74B	**GEOGRAPHICAL INFORMATION SYSTEM**	Have basic idea about the fundamentals of GIS.	3												3	3	3	
		Understand the types of data models	3				3								3	3	3	
		Get knowledge about data input and topology	3		3	3									3	3	3	
		Gain knowledge on data quality and standards	3	3	3	3	3								3	3	3	
		Understand data management functions and data output	3	3	3	3	3								3	3	3	
		Avg	**3**	**3**	3	3	3								3	3	3	
21150INT76	**SUMMER INTERNSHIP**	Industry Practices, Processes,Techniques, technology, automation and other coreaspects of software industry																
		Analyze, Design solutions to complex business problems																

		Build and Deploy solutions for target platform															
		Preparation of Technical reports and presentation															
21150C 81	**PROJECT WORK**	Gain Domain knowledge and technical skill set required for solving industry /research problems															
		Provide solution architecture, module level designs, algorithms															
		Implement, test and deploy the solution for the target platform															
		Prepare detailed technical report, demonstrate and present the work															

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SCHOOL OF ENGINEERING AND TECHNOLOGY		
DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING		
B.TECH - FULL TIME (UG - 2021)		
COURSE CODE	**COURSE TITLE**	**COURSE OUTCOMES**
21147S11	PROFESSIONAL ENGLISH I	To improve the communicative competence of learners To learn to use basic grammatic structures in suitable contexts To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text To help learners use language effectively in professional contexts To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.
21148S12	**MATRICES AND CALCULUS**	To develop the use of matrix algebra techniques that is needed by engineers for practical applications. To familiarize the students with differential calculus. To familiarize the student with functions of several variables. This is needed in many branches of engineering. To make the students understand various techniques of integration. To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications
21149S13	**ENGINEERING PHYSICS**	To make the students effectively to achieve an understanding of mechanics. To enable the students to gain knowledge of electromagnetic waves and its applications. To introduce the basics of oscillations, optics and lasers. Equipping the students to be successfully understand the importance of quantum physics. To motivate the students towards the applications of quantum mechanics.

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21149S14	ENGINEERING CHEMISTRY	To make the students conversant with boiler feed water requirements, related problems and water treatment techniques. To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys. Preparation, properties and applications of engineering materials. Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels. Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells
21150S15	**PROBLEM SOLVING AND PYTHON PROGRAMMING**	Develop algorithmic solutions to simple computational problems. Develop and execute simple Python programs. Write simple Python programs using conditionals and loops for solving problems. Decompose a Python program into functions. Represent compound data using Python lists, tuples, dictionaries etc. Read and write data from/to files in Python programs.
21150L16	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	Develop algorithmic solutions to simple computational problems Develop and execute simple Python programs. Implement programs in Python using conditionals and loops for solving problems.. Deploy functions to decompose a Python program. Process compound data using Python data structures. Utilize Python packages in developing software applications.
21149L17	PHYSICS AND CHEMISTRY LABORATORY	Understand the functioning of various physics laboratory equipment. Use graphical models to analyze laboratory data Use mathematical models as a medium for quantitative reasoning and describing physical reality. Access, process and analyze scientific information

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		Solve problems individually and collaboratively
21147L18	COMMUNICATION LABORATORY - I	To listen to and comprehend general as well as complex academic information To listen to and understand different points of view in a discussion To speak fluently and accurately in formal and informal communicative contexts To describe products and processes and explain their uses and purposes clearly and accurately To express their opinions effectively in both formal and informal discussions
21147S21	PROFESSIONAL ENGLISH – II	To compare and contrast products and ideas in technical texts. To identify and report cause and effects in events, industrial processes through technical texts To analyse problems in order to arrive at feasible solutions and communicate them in the written format. To present their ideas and opinions in a planned and logical manner To draft effective resumes in the context of job search.
21148S22A	STATISTICS AND NUMERICAL METHODS	Apply the concept of testing of hypothesis for small and large samples in real life problems. Apply the basic concepts of classifications of design of experiments in the field of agriculture. Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems. Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
21149S23C	PHYSICS FOR ELECTRICAL ENGINEERING	know basics of dielectric materials and insulation.

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		gain knowledge on the electrical and magnetic properties of materials and their applications
		understand clearly of semiconductor physics and functioning of semiconductor devices
		understand the optical properties of materials and working principles of various optical devices
		appreciate the importance of nanotechnology and nanodevices.
21154S24	ENGINEERING GRAPHICS	Use BIS conventions and specifications for engineering drawing.
		Construct the conic curves, involutes and cycloid.
		Solve practical problems involving projection of lines.
		Draw the orthographic, isometric and perspective projections of simple solids.
		Draw the development of simple solids.
21154S25	BASIC CIVIL AND MECHANICAL ENGINEERING	Understanding profession of Civil and Mechanical engineering.
		Summarise the planning of building, infrastructure and working of Machineries.
		Apply the knowledge gained in respective discipline
		Illustrate the ideas of Civil and Mechanical Engineering applications.
		Appraise the material, Structures, machines and energy.
21153S26B	**ELECTRIC CIRCUIT ANALYSIS**	Explain circuit's behavior using circuit laws.
		Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given DC and AC circuit
		Compute the transient response of first order and second order systems to step and sinusoidal input
		Compute power, line/ phase voltage and currents of the given three phase circuit
		Explain the frequency response of series and parallel RLC circuits
		Explain the behavior of magnetically coupled circuits.
21154L27	ENGINEERING PRACTICES LABORATORY	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.

		Wire various electrical joints in common household electrical wire work.
		Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.
21153L28B	ELECTRIC CIRCUITS LABORATORY	Use simulation and experimental methods to verify the fundamental electrical laws for the given DC/AC circuit (Ex 1)
		Use simulation and experimental methods to verify the various electrical theorems (Superposition, Thevenin , Norton and maximum power transfer) for the given DC/AC circuit (Ex 2-5)
		Analyze transient behavior of the given RL/RC/RLC circuit using simulation and experimental methods (Ex 6)
		Analyze frequency response of the given series and parallel RLC circuit using simulation and experimentation methods (Ex 7-8)
		Analyze frequency response of the given series and parallel RLC circuit using simulation and experimentation methods (Ex 7-8)
21147L29	COMMUNICATION LABORATORY - II	Speak effectively in group discussions held in formal/semi formal contexts.
		Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions
		Write emails, letters and effective job applications.
		Write critical reports to convey data and information with clarity and precision
		Give appropriate instructions and recommendations for safe execution of tasks
21148S31C	PROBABILITY AND COMPLEX FUNCTIONS	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.
		Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.
		To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.

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		To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.
		To acquaint the students with Differential Equations which are significantly used in engineering problems.
21153C32	DIGITAL LOGIC CIRCUITS	Explain various number systems and characteristics of digital logic families
		Apply K-maps and Quine McCluskey methods to simplify the given Boolean expressions
		Explain the implementation of combinational circuit such as multiplexers and demultiplexers - code converters, adders, subtractors, Encoders and Decoders
		Design various synchronous and asynchronous circuits using Flip Flops
		Explain asynchronous sequential circuits and programmable logic devices
		Use VHDL for simulating and testing RTL, combinatorial and sequential circuits
21153C33	ELECTROMAGNETIC FIELDS	Visualize and explain Gradient, Divergence, and Curl operations on electromagnetic vector fieldsand identify the electromagnetic sources and their effects.
		Compute and analyse electrostatic fields, electric potential, energy density along with their applications.
		Compute and analyse magneto static fields, magnetic flux density, vector potential along with their applications
		Explain different methods of emf generation and Maxwell's equations
		Explain the concept of electromagnetic waves and characterizing parameters
21153C34	ELECTRICAL MACHINES – I	Apply the laws governing the electromechanical energy conversion for singly and multiple excited systems.
		Explain the construction and working principle of DC machines.
		Interpret various characteristics of DC machines.
		Compute various performance parameters of the machine, by conducting suitable tests
		Draw the equivalent circuit of transformer and predetermine the efficiency and regulation.
		Describe the working principle of auto transformer, three phase transformer with different types of connections.

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21153S35	ELECTRON DEVICES AND CIRCUITS	Explain the structure and operation of PN junction devices (diode, Zener diode, LED and Laser diode)
		Design clipper, clamper, half wave and full wave rectifier, regulator circuits using PN junction diodes
		Analyze the structure and characteristics BJT, FET, MOSFET, UJT, Thyristor and IGBT
		Analyze the performance of various configurations of BJT and MOSFET based amplifier
		Explain the characteristics of MOS based cascade and differential amplifier
		Explain the operation of various feedback amplifiers and oscillators
21153S36	C PROGRAMMING AND DATA STRUCTURES	Develop C programs for any real world/technical application
		Apply advanced features of C in solving problems
		Write functions to implement linear and non–linear data structure operations.
		Suggest and use appropriate linear/non–linear data structure operations for solving a given problem.
		Appropriately use sort and search algorithms for a given application.
		Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.
21153L37	ELECTRONIC DEVICES AND CIRCUITS LABORATORY	Analyze the characteristics of PN, Zener diode and BJT in CE,CC,CB configurations experimentally
		Analyze the characteristics of JFET and UJT experimentally
		Analyze frequency response characteristics of a Common Emitter amplifier experimentally
		Analyze the characteristics of RC phase shift and LC oscillators experimentally
		Analyze the characteristics of half-wave and full-wave rectifier with and without
		Analyze the characteristics of FET based differential amplifier experimentally
		Calculate the frequency and phase angle using CRO experimentally
		Analyze the frequency response characteristics of passive filters experimentally

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21153L38	ELECTRICAL MACHINES LABORATORY-I	Construct the circuit with appropriate connections for the given DC machine/transformer
		Experimentally determine the characteristics of different types of DC machines
		Demonstrate the speed control techniques for a DC motor for industrial applications.
		Identify suitable methods for testing of transformer and DC machines.
		Predetermine the performance parameters of transformers and DC motor.
		Understand DC motor starters and 3-phase transformer connections.
21153L39	C PROGRAMMING AND DATA STRUCTURES LABORATORY	Use different constructs of C and develop applications
		Write functions to implement linear and non-linear data structure operations
		Suggest and use the appropriate linear / non-linear data structure operations for a given problem
		Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval
		Implement Sorting and searching algorithms for a given application
21153L34	**PROFESSIONAL DEVELOPMENT**	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements
		Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding
21153C41	**ELECTRICAL MACHINES - II**	Ability to understand the construction and working principle of Synchronous generator
		Ability to understand the construction and working principle of Synchronous Motor
		Ability to understand the construction and working principle of Three Phase Induction Motor
		Acquire knowledge about the starting and speed control of induction motors.
		To gain knowledge about the basic principles and working of Single phase induction motors and Special Electrical Machines

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21153C42	**TRANSMISSION AND DISTRIBUTION**	Understand the structure of power system, computation of transmission line parameters for different configurations.
		Model the transmission lines to determine the line performance and to understand the impact of Ferranti effect and corona on line performance.
		Do Mechanical design of transmission lines, grounding and to understand about the insulators in transmission system
		Design the underground cables and understand the performance analysis of underground cable
		Understand the modelling, performance analysis and modern trends in distribution system.
21153C43	**MEASUREMENTS AND INSTRUMENTATION**	Ability to understand the fundamental art of measurement in engineering
		Ability to understand the structural elements of various instruments.
		Ability to understand the importance of bridge circuits.
		: Ability to understand about various transducers and their characteristics by
		Ability to understand the concept of digital instrumentation and virtual instrumentation by experiments.
21153C44	**LNEAR INTEGRATED CIRCUITS**	Explain monolithic IC fabrication process
		Explain the fabrication of diodes, capacitance, resistance, FETs and PV Cell.
		Analyze the characteristics and basic applications (inverting/non-inverting amplifier, summer, differentiator, integrator, V/I and I/V converter) of Op-Amp
		Explain circuit and applications of op-amp based instrumentation amplifier, log/antilog amplifier, analog multiplier /divider, active filters, comparators, waveform generators, A/D and D/A converters
		Explain Functional blocks, characteristics and applications of Timer, PLL, analog multiplier ICs.
		Explain the applications of ICs in Instrumentation amplifier, fixed and variable voltage regulator,SMPS and function generator

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21153C45	MICROPROCESSOR AND MICROCONTROLLER	Ability to write assembly language program for microprocessor and microcontroller
		Ability to design and implement interfacing of peripheral with microprocessor and microcontroller
		Ability to analyze, comprehend, design and simulate microprocessor based systems used for control and monitoring.
		Ability to analyze, comprehend, design and simulate microcontroller based systems used for control and monitoring.
		Ability to understand and appreciate advanced architecture evolving microprocessor field
21149S46	**ENVIRONMENTAL SCIENCES AND SUSTAINABILITY**	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.
		To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.
		To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.
		To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.
		To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.
21153L47	ELECTRICAL MACHINES LABORATORY - II	Ability to understand and analyze EMF and MMF methods
		Ability to analyze the characteristics of V and Inverted V curves
		Acquire hands on experience of conducting various tests on alternators and obtaining their performance indices using standard analytical as well as graphical methods. to understand the importance of Synchronous machines

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		Acquire hands on experience of conducting various tests on induction motors and obtaining their performance indices using standard analytical as well as graphical methods. to understand the importance of single and three phase Induction motors
		Ability to acquire knowledge on separation of losses
21153L48	LINEAR AND DIGITAL CIRCUITS LABORATORY	Ability to understand and implement Boolean Functions
		Ability to understand the importance of code conversion
		Ability to Design and implement circuits with digital ICs like decoders, multiplexers, register.
		Ability to acquire knowledge on Application of Op-Amp
		Ability to Design and implement counters using analog ICs like timers, VCOs and digital ICs like Flip-flops and counters
21153L49	**MICROPROCESSOR AND MICROCONTROLLER LABORATORY**	Ability to write assembly language program for microprocessor
		Ability to write assembly language program for microcontroller
		Ability to design and implement interfacing of peripheral with microprocessor and microcontroller
		Ability to analyze, comprehend, design and simulate microprocessor based systems used for control and monitoring
		Ability to analyze, comprehend, design and simulate microcontroller based systems used for control and monitoring
21153C51	POWER SYSTEM ANALYSIS	Ability to model the power system under steady state operating condition.
		Ability to carry out power flow analysis using.
		Ability to infer the significance of short circuit studies in designing circuit breakers
		Ability to analyze the state of the power system for various unsymmetrical faults
		Ability to analyze the stability of power system using different methods.

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21153C52	CONTROL SYSTEMS	: Represent simple systems in transfer function and state variable forms
		Analyze simple systems in time domain.
		Analyze simple systems in frequency domain.
		: Infer the stability of systems in time and frequency domain.
		Interpret characteristics of the system and find out solution for simple control problems.
21153C53	POWER ELECTRONICS	Understand the operation of semiconductor devices and dynamic characteristics and to design &analyze the low power SMPS
		Analyze the various uncontrolled rectifiers and design suitable filter circuits
		Analyze the operation of the n-pulse converters and evaluate the performance
		Understand various PWM techniques and apply voltage control and harmonic elimination methods to inverter circuits
		Understand the operation of AC voltage controllers and its applications
21153E54A	UTILIZATION AND CONSERVATION OF ELECTRICAL ENERGY	Ability to choose suitable electric drives for different applications
		Ability to design the illumination systems for energy saving
		Ability to demonstrate the utilization of electrical energy for heating and welding purposes
		Ability to know the effective usage of solar and wind energies for electrical applications
		Ability to do electric connection for any domestic appliance like refrigerator, batte charging circuit for a specific household application.
		To illustrate the need for energy conservation and to simulate three phase pow control
21153E55A	**SPECIAL ELECTRICAL MACHINES**	Ability to model and analyze power electronic systems and equipment using computational software.
		Ability to optimally design magnetics required in special machines based drive systems using FEM based software tools.
		Ability to analyse the dynamic performance of special electrical machines

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		Ability to understand the operation and characteristics of other special electrical
		Ability to design and conduct experiments towards research.
21153E56D	**VLSI DESIGN**	Develop CMOS design techniques
		Learn and build IC fabrication
		Explain the need of reconfigurable computing with PLDs
		Design and development of reprogrammable FPGA.
		Illustrate and develop HDL computational processes with improved design strategies.
21147MC51D	DISASTER MANAGEMENT	To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR
		To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction
		To develop disaster response skills by adopting relevant tools and technology
		Enhance awareness of institutional processes for Disaster response in the country and
		Develop rudimentary ability to respond to their surroundings with potential Disaster response
21153L57	CONTROL AND INSTRUMENTATION LABORATORY	To model and analyze simple physical systems and simulate the performance in analog and digital platform.
		To design and implement simple controllers in standard forms.
		To design compensators based on time and frequency domain specifications.
		To design a complete closed control loop and evaluate its performance for simple physical systems.
		To analyze the stability of a physical system in both continuous and discrete domains.
21153L58	POWER ELECTRONICS LABORATORY	Determine the characteristics of SCR, IGBT, TRIAC, MOSFET and IGBT
		Find the transfer characteristics of full converter, semi converter, step up and step down choppers by simulation experimentation.
		Analyze the voltage waveforms for PWM inverter using various modulation techniques

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		Design and experimentally verify the performance of basic DC/DC converter topologies used for SMPS.
		Understand the performance of AC voltage controllers by simulation and experimentation
21150OE61A	**IOT CONCEPTS AND APPLICATIONS**	Explain the concept of IoT.
		Understand the communication models and various protocols for IoT.
		Design portable IoT using Arduino/Raspberry Pi /open platform
		Apply data analytics and use cloud offerings related to IoT
		Analyze applications of IoT in real time scenario.
21153C62	POWER SYSTEM OPERATION AND CONTROL	Understand the day – to – day operation of power system.
		Model and analyse the control actions that are implemented to meet the minute-to- minute variation of system real power demand.
		Model and analyze the compensators for reactive power control and various devices used for voltage control.
		Prepare day ahead and real time economic generation scheduling.
		Understand the necessity of computer control of power systems
21153C63	PROTECTION AND SWITCHGEAR	Understand and select proper protective scheme and type of earthing.
		Explain the operating principles of various relays.
		Suggest suitable protective scheme for the protection of various power system apparatus.
		Analyze the importance of static relays and numerical relays in power system protection.
		Summarize the merits and demerits and application areas of various circuit breakers.
21153E64B	**POWER QUALITY**	Use various definitions of power quality for power quality issues
		Describe the concepts related with single phase / three phase, linear / nonlinear loads and single phase / three phase sinusoidal, non-sinusoidal source
		Solve problems related with mitigation of Power System Harmonics

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		Use DSTATCOM for load compensation
		Demonstrate the role of DVR, SAFs UPQC in power distribution systems
21153E65A	**HVDC AND FACTS**	To Identify and understand the problems in AC transmission systems and understand the need for Flexible AC transmission systems and HVDC Transmission
		To understand the operation and control of SVC and TCSC and its applications to enhance the stability and damping
		To Analyze basic operation and control of voltage source converter based FACTS controllers
		To demonstrate basic operation and control of Line Commutated HVDC Transmission
		To explain the d-q control based operation of VSC based HVDC Transmission
21153E66E	**HYBRID ENERGY TECHNOLOGY**	Analyze the impacts of hybrid energy technologies on the environment and demonstrate them to harness electrical power.
		Select a suitable Electrical machine for Wind Energy Conversion Systems and simulate wind energy conversion system
		Design the power converters such as AC-DC, DC-DC, and AC-AC converters for SPV systems
		Analyze the power converters such as AC-DC, DC-DC, and AC-AC converters for Hybrid energy systems
		Interpret the hybrid renewable energy systems
21153L67	**POWER SYSTEM LABORATORY**	Model and analyze the performance of the transmission lines.
		Perform power flow, short circuit, and stability analysis for any power system network
		Understand, design, and analyze the load frequency control mechanism.
		Perform optimal scheduling of generators and compute the state of the power system
		Understand, analyze, and apply the relays for power system protection.
21147S71	HUMAN VALUES AND ETHICS	Identify the importance of democratic, secular and scientific values in harmonious functioning of social life

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		Practice democratic and scientific values in both their personal and professional life.
		Find rational solutions to social problems.
		Behave in an ethical manner in society
		Practice critical thinking and the pursuit of truth.
21153C77	HIGH VOLTAGE ENGINEERING	Explain various overvoltage's and its effects on power systems
		Understand the breakdown phenomena in different medium under uniform and non- uniform fields
		Explain the methods of generating
		Suggest and Conduct suitable HV testing of Electrical power apparatus as per Standards
		Explain the Industrial Applications of Electrostatic Fields.
21150OE74B	**DATA SCIENCE FUNDAMENTALS**	Gain knowledge on data science process
		Perform data manipulation functions using Numpy and Pandas
		Understand different types of machine learning approaches
		Perform data visualization using tools.
		Handle large volumes of data in practical scenarios.
21147OE73A	ENGLISH FOR COMPETITIVE EXAMINATIONS	Expand their vocabulary and gain practical techniques to read and comprehend a wide range of texts with the emphasis required
		identify errors with precision and write with clarity and coherence
		understand the importance of task fulfilment and the usage of task-appropriate vocabulary
		communicate effectively in group discussions, presentations and interviews
		write topic based essays with precision and accuracy
21155OE74A	**GEOGRAPHICAL INFORMATION SYSTEM**	Have basic idea about the fundamentals of GIS.
		Understand the types of data models.
		Get knowledge about data input and topology
		Gain knowledge on data quality and standards
		Understand data management functions and data output

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		Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling.
		Have same basic knowledge on international aspect of management
		Ability to understand management concept of organizing.
		Ability to understand management concept of directing.
		Ability to understand management concept of controlling
21160S75F	**PRINCIPLES OF MANAGEMENT**	
21153E76B	**MULTILEVEL POWER CONVERTERS**	Examine the different topologies of multilevel inverters (MLIs) with and without DC link capacitor.
		Examine the performance of MLIs with Bipolar Pulse Width Modulation (PWM) Unipolar PWM Carrier-Based PWM Schemes Phase Level Shifted Multicarrier Modulation
		Demonstrate the working principles of Cascaded H-Bridge MLI, diode clamped MLI, flying capacitor MLI and MLI with reduced switch count
		Analyze the voltage balancing performance in Diode clamped MLI
		Simulate three level, capacitor clamed and diode clamped MLI with R and RL load.
		Simulate MLI with reduced switch configuration using fundamental switching scheme
21153P81	PROJECT WORK / INTERNSHIP	Ability to identify, formulate, design, interprete,analyze and provide solutions to complex engineering and societal issues by applying knowledge gained on basics of science and Enginnering
		Ability to choose, conduct and demonstrate a sound technical knowledge of their selected project topics in the field of power components, protection, highvoltage, electronics, process automation, power electronics and drives instrumentation and control by exploring suitable engineering and IT tools
		Ability to understand, formulate and propose new learning algorithms to solve engineering and societal problems of moderate complexity through multidisciplinary projectsunderstanding commitment towards sustainable development
		Ability to demonstrate, prepare reports, communicate and work in a team as a member/leader by adhering to ethical responsibilities

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		Ability to acknowledge the value of continuing education for oneself and to stay up with technology advancements

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PRIST
DEEMED TO BE
UNIVERSITY
NAAC ACCREDITED
THANJAVUR – 613 403 - TAMIL NADU

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

B.TECH - FULL TIME (UG - 2021)

COURSE CODE	COURSE TITLE	CO	COURSE OUTCOMES	PO1	PO2	Po 3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	P012	PSO 1	PSO 2	PSO3
		CO 1	To improve the communicative competence of learners	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
		CO 2	To learn to use basic grammatic structures in suitable contexts	1	1	1	1	1	3	3	3	1	3	-	3	-	-	-
		CO 3	To acquire lexical competence and use them appropriately in a sentence and understand their meaning in a text	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
		C04	To help learners use language effectively in professional contexts	2	3	2	3	2	3	3	3	2	3	3	3	-	-	-
		C05	To develop learners' ability to read and write complex texts, summaries, articles, blogs, definitions, essays and user manuals.	2	3	3	3	-	3	3	3	2	3	-	3	-	-	-
21147S11	PROFESSIONAL ENGLISH I	Avg.		1.6	2.2	1.8	2.2	1.5	3	3	3	1.6	3	3	3	-	-	-

		1	To develop the use of matrix algebra techniques that is needed by engineers for practical applications.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		2	To familiarize the students with differential calculus.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		3	To familiarize the student with functions of several variables. This is needed in many branches of engineering.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		4	To make the students understand various techniques of integration.	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		5	To acquaint the student with mathematical tools needed in evaluating multiple integrals and their applications	3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
21148S12	**MATRICES AND CALCULUS**	Avg.		3	3	1	1	0	0	0	0	2	0	2	3	-	-	-
		1	To make the students effectively to achieve an understanding of mechanics.	3	3	2	1	1	1	-	-	-	-	-	-	-	-	-
		2	To enable the students to gain knowledge of electromagnetic waves and its applications.	3	3	2	1	2	1	-	-	-	-	-	-	-	-	-
		3	To introduce the basics of oscillations, optics and lasers.	3	3	2	2	2	1	-	-	-	-	-	1	-	-	-
	ENGINEERING PHYSICS	4	Equipping the students to be successfully understand the importance of quantum physics.	3	3	1	1	2	1	-	-	-	-	-	-	-	-	
		5	To motivate the students towards the applications of quantum mechanics.	3	3	1	1	2	1	-	-	-	-	-	-	-	-	-
21149S13		Avg.		3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-	-	-
21149S14	ENGINEERING CHEMISTRY	1	To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.	3	2	2	1	-	1	1	-	-	-	-	1	-	-	-

		2	To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.	2	-	-	1	-	2	2	-	-	-	-	-	-	-	-
		3	Preparation, properties and applications of engineering materials.	3	1	-	-	-	-	-	-	-	-	-	-	-	-	-
		4	Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.	3	1	1	-	-	1	2	-	-	-	-	-	-	-	-
		5	Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells	3	1	2	1	-	2	2	-	-	-	-	2	-	-	-
		Avg.		2.8	1.3	1.6	1	-	1.5	1.8	-	-	-	-	1.5	-	-	-
21150S15	PROBLEM SOLVING AND PYTHON PROGRAMMING	1	Develop algorithmic solutions to simple computational problems.	3	3	3	3	2	-	-	-	-	-	2	2	3	3	-
		2	Develop and execute simple Python programs.	3	3	3	3	2	-	-	-	-	-	2	2	3	-	-
		3	Write simple Python programs using conditionals and loops for solving problems.	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-
		4	Decompose a Python program into functions.	2	2	-	2	2	-	-	-	-	-	1	-	3	-	-
		5	Represent compound data using Python lists, tuples, dictionaries etc.	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
		6	Read and write data from/to files in Python programs.	2	2	-	-	2	-	-	-	-	-	1	-	2	-	-
		Avg.		2	3	3	3	2	-	-	-	-	-	2	2	3	3	-
21150L16	PROBLEM SOLVING AND PYTHON PROGRAMMING LABORATORY	1	Develop algorithmic solutions to simple computational problems	3	3	3	3	3	-	-	-	-	-	3	2	3	3	-

		2	Develop and execute simple Python programs.	3	3	3	3	3	-	-	-	-	-	3	2	3	-	-
		3	Implement programs in Python using conditionals and loops for solving problems..	3	3	3	3	2	-	-	-	-	-	2	-	3	-	-
		4	Deploy functions to decompose a Python program.	3	2	-	2	2	-	-	-	-	-	1	-	3	-	-
		5	Process compound data using Python data structures.	1	2	-	-	1	-	-	-	-	-	1	-	2	-	-
		6	Utilize Python packages in developing software applications.	2	-	-	-	2	-	-	-	-	-	1	-	2	-	-
		Avg.		2	3	3	3	2	-	-	-	-	-	2	2	3	3	-
21149L17	PHYSICS AND CHEMISTRY LABORATORY	1	Understand the functioning of various physics laboratory equipment.	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
		2	Use graphical models to analyze laboratory data	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
		3	Use mathematical models as a medium for quantitative reasoning and describing physical reality.	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
		4	Access, process and analyze scientific information	3	3	2	1	1	-	-	-	-	-	-	-	-	-	-
		5	Solve problems individually and collaboratively	3	2	3	1	1	-	-	-	-	-	-	-	-	-	-
		Avg.		3	2.4	2.6	1	1	-	-	-	-	-	-	-	-	-	-
21147L18	COMMUNICATION LABORATORY - I	1	To listen to and comprehend general as well as complex academic information	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
		2	To listen to and understand different points of view in a discussion	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
		3	To speak fluently and accurately in formal and informal communicative contexts	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-

		4	To describe products and processes and explain their uses and purposes clearly and accurately	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
		5	To express their opinions effectively in both formal and informal discussions	3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
		Avg.		3	3	3	3	1	3	3	3	3	3	3	3	-	-	-
21147S21	PROFESSIONAL ENGLISH – II	1	To compare and contrast products and ideas in technical texts.	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
		2	To identify and report cause and effects in events, industrial processes through technical texts	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
		3	To analyse problems in order to arrive at feasible solutions and communicate them in the written format.	3	3	3	3	3	3	3	3	2	3	3	3	-	-	-
		4	To present their ideas and opinions in a planned and logical manner	3	3	3	3	2	3	3	3	2	3	3	3	-	-	-
		5	To draft effective resumes in the context of job search.	-	-	-	-	-	-	-	-	3	3	3	3	-	-	-
		Avg.		3	3	3	3	2.75	3	3	3	2.2	3	3	3	-	-	-
21148S22A	STATISTICS AND NUMERICAL METHODS	1	Apply the concept of testing of hypothesis for small and large samples in real life problems.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		2	Apply the basic concepts of classifications of design of experiments in the field of agriculture.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		3	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-

		4	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		5	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
		Avg.		3	3	1	1	1	0	0	0	2	0	2	3	-	-	-
21149S23C	PHYSICS FOR ELECTRICAL ENGINEERING	1	know basics of dielectric materials and insulation.	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
		2	gain knowledge on the electrical and magnetic properties of materials and their applications	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
		3	understand clearly of semiconductor physics and functioning of semiconductor devices	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
		4	understand the optical properties of materials and working principles of various optical devices	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
		5	appreciate the importance of nanotechnology and nanodevices.	3	2	1	-	-	1	-	-	-	-	-	-	-	-	-
		Avg.		3	2	1			1	-	-	-	-	-	-	-	-	-
21154S24	ENGINEERING GRAPHICS	1	Use BIS conventions and specifications for engineering drawing.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
		2	Construct the conic curves, involutes and cycloid.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
		3	Solve practical problems involving projection of lines.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
		4	Draw the orthographic, isometric and perspective projections of simple solids.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-

		5	Draw the development of simple solids.	3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
		Avg.		3	1	2	-	2	-	-	-	-	3	-	2	2	2	-
21154S25	BASIC CIVIL AND MECHANICAL ENGINEERING	1	Understanding profession of Civil and Mechanical engineering.	2	-	-	1	-	-	1	2	1	2	-	1	-	-	-
		2	Summarise the planning of building, infrastructure and working of Machineries.	2	-	-	-	-	-	1	2	1	2	-	2	-	-	-
		3	Apply the knowledge gained in respective discipline	2	-	-	-	-	-	1	2	2	2	-	2	-	-	-
		4	Illustrate the ideas of Civil and Mechanical Engineering applications.	2	-	-	-	-	-	1	2	1	2	-	2	-	-	-
		5	Appraise the material, Structures, machines and energy.	2	-	-	-	-	-	1	2	1	2	-	2	-	-	-
		Avg.		2	-	-	0.2	-	-	1	2	1.2	2	-	1.8	-	-	-
21153S26B	**ELECTRIC CIRCUIT ANALYSIS**	CO 1	Explain circuit's behavior using circuit laws.	3	3	3	2	2	-	2	1	-	-	-	3	3	3	3
		CO 2	Apply mesh analysis/ nodal analysis / network theorems to determine behavior of the given DC and AC circuit	3	3	3	3	2	-	2	1	-	-	-	3	3	3	3
		CO 3	Compute the transient response of first order and second order systems to step and sinusoidal input	3	3	3	3	2	-	2	1	-	-	-	3	3	3	3
		CO 4	Compute power, line/ phase voltage and currents of the given three phase circuit	3	3	3	3	2	-	2	1	-	-	-	3	3	3	3
		CO 5	Explain the frequency response of series and parallel RLC circuits	3	3	3	3	2	-	2	1	-	-	-	3	3	3	3
		CO 6	Explain the behavior of magnetically coupled circuits.	3	3	3	3	2	-	2	1	-	-	-	3	3	3	3
		Avg.		3	3	3	2.8	2	-	2	1	-	-	-	3	3	3	3

21154L27	ENGINEERING PRACTICES LABORATORY	1	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
		2	Wire various electrical joints in common household electrical wire work.	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
		3	Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.	3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
		Avg.		3	2	-	-	1	1	1	-	-	-	-	2	2	1	1
21153L28B	ELECTRIC CIRCUITS LABORATORY	1	Use simulation and experimental methods to verify the fundamental electrical laws for the given DC/AC circuit (Ex 1)	3	3	3	3	3	-	2	1.5	3	-	-	3	3	3	2
		2	Use simulation and experimental methods to verify the various electrical theorems (Superposition, Thevenin , Norton and maximum power transfer) for the given DC/AC circuit (Ex 2-5)	3	3	3	3	3	-	2	1.5	3	-	-	3	3	3	2
		3	Analyze transient behavior of the given RL/RC/RLC circuit using simulation and experimental methods (Ex 6)	3	3	3	3	3	-	2	1.5	3	-	-	3	3	3	2
		4	Analyze frequency response of the given series and parallel RLC circuit using simulation and experimentation methods (Ex 7-8)	3	3	3	3	3	-	2	1.5	3	-	-	3	3	3	2
		5	Analyze frequency response of the given series and parallel RLC circuit using simulation and experimentation methods (Ex 7-8)	3	3	3	3	3	-	2	1.5	3	-	-	3	3	3	2
		Avg.		3	3	3	3	3	-	2	1.5	3	-	-	3	3	3	2

21147L29	COMMUNICATION LABORATORY - II	1	Speak effectively in group discussions held in formal/semi formal contexts.	1	2	3	3	3	1	3	3	3	3	3	3	3	-	-
		2	Discuss, analyse and present concepts and problems from various perspectives to arrive at suitable solutions	2	2	3	3	3	1	3	3	3	3	3	3	3	-	-
		3	Write emails, letters and effective job applications.	3	2	2	3	3	1	3	3	3	3	3	3	3	-	-
		4	Write critical reports to convey data and information with clarity and precision	4	3	3	3	3	3	3	3	3	3	3	3	3	-	-
		5	Give appropriate instructions and recommendations for safe execution of tasks	5	3	3	3	3	3	3	3	3	3	3	3	3	-	-
		Avg.		Avg.	2.4	2.8	3	3	1.8	3	3	3	3	3	3	3	-	-
21148S31C	PROBABILITY AND COMPLEX FUNCTIONS	1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon.	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
		2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications.	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
		3	To develop an understanding of the standard techniques of complex variable theory in particular analytic function and its mapping property.	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
		4	To familiarize the students with complex integration techniques and contour integration techniques which can be used in real integrals.	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
		5	To acquaint the students with Differential Equations which are significantly used in engineering problems.	3	3	0	0	0	0	0	0	2	0	0	2	-	-	-
		Avg.		3	3	0	0	0	0	0	0	2	0	0	2	-	-	-

21153C32	DIGITAL LOGIC CIRCUITS	CO 1	Explain various number systems and characteristics of digital logic families	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
		CO 2	Apply K-maps and Quine McCluskey methods to simplify the given Boolean expressions	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
		CO 3	Explain the implementation of combinational circuit such as multiplexers and demultiplexers - code converters, adders, subtractors, Encoders and Decoders	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
		CO 4	Design various synchronous and asynchronous circuits using Flip Flops	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
		CO 5	Explain asynchronous sequential circuits and programmable logic devices	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
		Av g	Use VHDL for simulating and testing RTL, combinatorial and sequential circuits	3	3	3	1	3	-	-	1	-	-	-	1	3	-	1
21153C33	ELECTROMAGNE TIC FIELDS	CO 1	Visualize and explain Gradient, Divergence, and Curl operations on electromagnetic vector fieldsand identify the electromagnetic sources and their effects.	3	2	-	-	-	-	3	1	-	-	-	1	3	2	1
		CO 2	Compute and analyse electrostatic fields, electric potential, energy density along with their applications.	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
		CO 3	Compute and analyse magneto static fields, magnetic flux density, vector potential along with their applications	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
		CO 4	Explain different methods of emf generation and Maxwell's equations	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
		CO 5	Explain the concept of electromagnetic waves and characterizing parameters	3	2	1	2	-	-	1	1	-	-	-	1	3	2	1
		Av g.		3	2	1	2	-	-	1.4	1	-	-	-	1	3	2	1
21153C34	ELECTRICAL MACHINES – I	CO 1	Apply the laws governing the electromechanical energy conversion for singly and multiple excited systems.	3	3	1	1	1	-	-	1	-	-	-	1	3	2	2

		CO 2	Explain the construction and working principle of DC machines.	3	3	1	1	1	-	-	1	-	-	-	1	3	1	1
		CO 3	Interpret various characteristics of DC machines.	3	3	1	1	1	-	-	1	-	-	-	1	3	1	1
		CO 4	Compute various performance parameters of the machine, by conducting suitable tests	3	3	1	1	1	-	-	1	-	-	-	1	3	3	2
		CO 5	Draw the equivalent circuit of transformer and predetermine the efficiency and regulation.	3	3	1	1	1	-	-	1	-	-	-	1	3	3	2
		CO 6	Describe the working principle of auto transformer, three phase transformer with different types of connections.	3	3	1	1	1	-	-	1	-	-	-	1	3	3	2
		Av g		3	3	1	1	1	-	-	1	-	-	-	1	3	3	3
21153S35	ELECTRON DEVICES AND CIRCUITS	CO 1	Explain the structure and operation of PN junction devices (diode, Zener diode, LED and Laser diode)	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
		CO 2	Design clipper, clamper, half wave and full wave rectifier, regulator circuits using PN junction diodes	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
		CO 3	Analyze the structure and characteristics BJT, FET, MOSFET, UJT, Thyristor and IGBT	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
		CO 4	Analyze the performance of various configurations of BJT and MOSFET based amplifier	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
		CO 5	Explain the characteristics of MOS based cascade and differential amplifier	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
		Av g.	Explain the operation of various feedback amplifiers and oscillators	2	2	3	2	2	-	-	1	-	-	-	1	3	-	1
21153S36	C PROGRAMMING AND DATA STRUCTURES	1	Develop C programs for any real world/technical application	2	3	1	2	2	1	1	-	1	2	1	3	2	1	3

		2	Apply advanced features of C in solving problems	1	2	1	2	2	-	-	-	1	1	1	2	2	2	2
		3	Write functions to implement linear and non-linear data structure operations.	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
		4	Suggest and use appropriate linear/non-linear data structure operations for solving a given problem.	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
		5	Appropriately use sort and search algorithms for a given application.	1	2	1	2	2	1	1	-	1	2	1	3	2	2	3
		Avg.	Apply appropriate hash functions that result in a collision free scenario for data storage and retrieval.	2	2	1	2	2	1	1	-	1	1	1	2	2	2	2
21153L37	ELECTRONIC DEVICES AND CIRCUITS LABORATORY	CO 1	Analyze the characteristics of PN, Zener diode and BJT in CE,CC,CB configurations experimentally	-	-	-	3	3	-	-	1.5	-	-	3	-	-	3	3
		CO 2	Analyze the characteristics of JFET and UJT experimentally	-	-	3	3	3	-	-	1.5	-	-	3	-	-	3	3
		CO 3	Analyze frequency response characteristics of a Common Emitter amplifier experimentally	-	3	2	3	-	-	-	1.5	-	-	3	-	-	3	3
		CO 4	Analyze the characteristics of RC phase shift and LC oscillators experimentally	-	3	3	3	-	-	-	1.5	-	-	3	-	-	3	3
		CO 5	Analyze the characteristics of half-wave and full-wave rectifier with and without	-	-	-	-	3	-	-	1.5	-	-	-	-	-	3	3
		CO 6	Analyze the characteristics of FET based differential amplifier experimentally	-	-	-	-	3	-	-	1.5	-	-	-	-	-	3	3
		CO 7	Calculate the frequency and phase angle using CRO experimentally	-	-	-	-	3	-	-	1.5	-	-	3	-	-	3	3
		CO 8	Analyze the frequency response characteristics of passive filters experimentally	-	-	-	-	3	-	-	1.5	-	-	3	-	-	3	3

		Avg		-	3	2.7	3	3	-	-	1.5	-	-	3	-	-	3	3
21153L38	ELECTRICAL MACHINES LABORATORY-I	CO 1	Construct the circuit with appropriate connections for the given DC machine/transformer	3	3	1	1	-	-	-	-	1	-	-	-	3	1	1
		CO 2	Experimentally determine the characteristics of different types of DC machines	3	3	1	1	-	-	-	-	1	-	-	-	3	3	2
		CO 3	Demonstrate the speed control techniques for a DC motor for industrial applications.	3	3	1	1	-	-	-	-	1	-	-	-	3	3	2
		CO 4	Identify suitable methods for testing of transformer and DC machines.	3	3	1	1	-	-	-	-	1	-	-	-	2	3	2
		CO 5	Predetermine the performance parameters of transformers and DC motor.	3	3	1	1	-	-	-	-	1	-	-	-	2	3	2
		CO 6	Understand DC motor starters and 3-phase transformer connections.	3	3	1	1	-	-	-	-	1	-	-	-	2	3	1
		Avg		3	3	1	1	-	-	-	-	1	-	-	-	2.5	2.6	1.6
21153L39	C PROGRAMMING AND DATA STRUCTURES LABORATORY	1	Use different constructs of C and develop applications	2	3	1	2	2	1	1	-	1	2	1	3	2	1	3
		2	Write functions to implement linear and non-linear data structure operations	1	2	1	2	2	-	-	-	1	1	1	2	2	2	2
		3	Suggest and use the appropriate linear / non-linear data structure operations for a given problem	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
		4	Apply appropriate hash functions that result in a collision free scenario for data storage and Retrieval	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
		5	Implement Sorting and searching algorithms for a given application	1	2	1	2	2	1	1	-	1	2	1	3	2	2	3

		Avg.		2	2	1	2	2	1	1	-	1	1	1	2	2	2	2
21153L34	**PROFESSIONAL DEVELOPMENT**	1	Use MS Word to create quality documents, by structuring and organizing content for their day to day technical and academic requirements	2	3	1	2	3	-	-	-	1	1	1	2	2	1	2
		2	Use MS EXCEL to perform data operations and analytics, record, retrieve data as per requirements and visualize data for ease of understanding	2	1	-	1	1	-	-	-	2	1	1	2	2	3	1
21153C41	**ELECTRICAL MACHINES - II**	CO 1	Ability to understand the construction and working principle of Synchronous generator	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
		CO 2	Ability to understand the construction and working principle of Synchronous Motor	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
		CO 3	Ability to understand the construction and working principle of Three Phase Induction Motor	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
		CO 4	Acquire knowledge about the starting and speed control of induction motors.	3	3	2	3	3	-	-	1	-	-	-	-	3	3	2
		CO 5	To gain knowledge about the basic principles and working of Single phase induction motors and Special Electrical Machines	3	3	1	1	2	-	-	1	-	-	-	-	3	3	2
		Avg		3	3	1.6	2.3	2.6	-	-	1	-	-	-	-	3	3	2
21153C42	**TRANSMISSION AND DISTRIBUTION**	CO 1	Understand the structure of power system, computation of transmission line parameters for different configurations.	2	1	-	-	-	-	-	1	-	-	-	-	3	1	1
		CO 2	Model the transmission lines to determine the line performance and to understand the impact of Ferranti effect and corona on line performance.	3	2	1	1	-	1	-	2	-	-	-	-	3	2	1
		CO 3	Do Mechanical design of transmission lines, grounding and to understand about the insulators in transmission system	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1

		CO 4	Design the underground cables and understand the performance analysis of underground cable	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1
		CO 5	Understand the modelling, performance analysis and modern trends in distribution system.	3	2	1	1	-	1	-	2	-	-	-	-	3	3	1
		Avg		2.8	1.8	1	1		1	-	1.8					3	2.4	1
21153C43	**MEASUREMENTS AND INSTRUMENTATION**	CO 1	Ability to understand the fundamental art of measurement in engineering	3	2	3	-	3	2	-	2	-	-	-	3	3	3	3
		CO 2	Ability to understand the structural elements of various instruments.	3	2	3	2	-	-	-		-	3	-	3	3	3	3
		CO 3	Ability to understand the importance of bridge circuits.	3	2	3	-	3	2	-		-	-	-	3	3	3	3
		CO 4	: Ability to understand about various transducers and their characteristics by	3	2	3	-	-	-	-	2	-	-	-	-	3	3	3
		CO 5	Ability to understand the concept of digital instrumentation and virtual instrumentation by experiments.	3	2	3	2	3	-	-		-	3	-	3	3	3	3
		Av g		3	2	3	2	3	2	-	2	-	3	-	3	3	3	3
21153C44	**LNEAR INTEGRATED CIRCUITS**	CO 1	Explain monolithic IC fabrication process	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
		CO 2	Explain the fabrication of diodes, capacitance, resistance, FETs and PV Cell.	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
		CO 3	Analyze the characteristics and basic applications (inverting/non-inverting amplifier, summer, differentiator, integrator, V/I and I/V converter) of Op-Amp	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1

		CO 4	Explain circuit and applications of op-amp based instrumentation amplifier, log/antilog amplifier, analog multiplier /divider, active filters, comparators, waveform generators, A/D and D/A converters	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
		CO 5	Explain Functional blocks, characteristics and applications of Timer, PLL, analog multiplier ICs.	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
		Avg	Explain the applications of ICs in Instrumentation amplifier, fixed and variable voltage regulator,SMPS and function generator	2	2	3	2	2	-	-	1	-	-	-	1	3	2	1
21153C45	MICROPROCESSOR AND MICROCONTROLLER	CO 1	Ability to write assembly language program for microprocessor and microcontroller	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
		CO 2	Ability to design and implement interfacing of peripheral with microprocessor and microcontroller	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
		CO 3	Ability to analyze, comprehend, design and simulate microprocessor based systems used for control and monitoring.	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
		CO 4	Ability to analyze, comprehend, design and simulate microcontroller based systems used for control and monitoring.	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
		CO 5	Ability to understand and appreciate advanced architecture evolving microprocessor field	2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
		Avg		2	1	2	3	-	-	-	1	-	-	-	3	3	1	3
21149S46	**ENVIRONMENTAL SCIENCES AND SUSTAINABILITY**	1	To recognize and understand the functions of environment, ecosystems and biodiversity and their conservation.	2	1	-	-	-	2	3	-	-	-	-	2	-	-	-

		2	To identify the causes, effects of environmental pollution and natural disasters and contribute to the preventive measures in the society.	3	2	-	-	-	3	3	-	-	-	-	2	-	-	-
		3	To identify and apply the understanding of renewable and non-renewable resources and contribute to the sustainable measures to preserve them for future generations.	3	-	1	-	-	2	2	-	-	-	-	2	-	-	-
		4	To recognize the different goals of sustainable development and apply them for suitable technological advancement and societal development.	3	2	1	1	-	2	2	-	-	-	-	2	-	-	-
		5	To demonstrate the knowledge of sustainability practices and identify green materials, energy cycles and the role of sustainable urbanization.	3	2	1	-	-	2	2	-	-	-	-	1	-	-	-
		Avg.		2.8	1.8	1	1	-	2.2	2.4	-	-	-	-	1.8	-	-	-
21153L47	ELECTRICAL MACHINES LABORATORY - II	CO 1	Ability to understand and analyze EMF and MMF methods	3	3	1	1	-	-	-	1.5	1	-	-	3	3	3	2
		CO 2	Ability to analyze the characteristics of V and Inverted V curves	3	3	1	1	-	-	-	1.5	1	-	-	3	3	3	2
		CO 3	Acquire hands on experience of conducting various tests on alternators and obtaining their performance indices using standard analytical as well as graphical methods. to understand the importance of Synchronous machines	3	3	1	1	-	-	-	1.5	1	-	-	3	3	3	1

		CO 4	Acquire hands on experience of conducting various tests on induction motors and obtaining their performance indices using standard analytical as well as graphical methods. to understand the importance of single and three phase Induction motors	3	3	1	1	-	-	-	1.5	1	-	-	3	3	3	1
		CO 5	Ability to acquire knowledge on separation of losses	3	3	1	1	-	-	-	1.5	1	-	-	2	3	3	2
		Avg		3	3	1	1	-	-	-	1.5	1	-	-	2.8	3	3	1.6
21153L48	LINEAR AND DIGITAL CIRCUITS LABORATORY	CO 1	Ability to understand and implement Boolean Functions	-	-	-	3	-	-	-	1.5	-	-	3	3	2	1	2
		CO 2	Ability to understand the importance of code conversion	-	-	3	3	-	-	-	1.5	-	-	3	3	2	1	2
		CO 3	Ability to Design and implement circuits with digital ICs like decoders, multiplexers, register.	-	3	2	3	3	-	-	1.5	-	-	3	3	2	1	2
		CO 4	Ability to acquire knowledge on Application of Op-Amp	-	3	3	3	3	-	-	1.5	-	-	3	3	2	1	2
		CO 5	Ability to Design and implement counters using analog ICs like timers, VCOs and digital ICs like Flip-flops and counters	-	-	-	-	-	-	-	1.5	-	-	-	3	-	-	-
		Avg		-	3	1.6	3	3	-	-	1.5	-	-	3	3	2	1	2
21153L49	**MICROPROCESSOR AND MICROCONTROLLER LABORATORY**	CO 1	Ability to write assembly language program for microprocessor	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
		CO 2	Ability to write assembly language program for microcontroller	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3

		CO 3	Ability to design and implement interfacing of peripheral with microprocessor and microcontroller	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
		CO 4	Ability to analyze, comprehend, design and simulate microprocessor based systems used for control and monitoring	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
		CO 5	Ability to analyze, comprehend, design and simulate microcontroller based systems used for control and monitoring	2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
		Avg		2	1	2	3	-	-	-	1.5	-	-	-	3	3	1	3
21153C51	POWER SYSTEM ANALYSIS	CO 1	Ability to model the power system under steady state operating condition.	3	2	2	1	1	-	-	-	1	-	-	-	1	-	2
		CO 2	Ability to carry out power flow analysis using.	3	3	3	2	1	-	-	-	1	-	-	-	1	1	1
		CO 3	Ability to infer the significance of short circuit studies in designing circuit breakers	3	3	3	2	1	-	-	-	1	-	-	1	1	1	1
		CO 4	Ability to analyze the state of the power system for various unsymmetrical faults	3	2	2	2	2	-	-	-	1	-	-	1	1	1	2
		CO 5	Ability to analyze the stability of power system using different methods.	3	3	2	2	2	-	-	-	1	-	-	1	1	1	1
		Avg		3	2.6	2.4	1.8	1.4	-	-	-	1	-	-	1	1	1	1.4
21153C52	CONTROL SYSTEMS	CO 1	: Represent simple systems in transfer function and state variable forms	3	3	3	3	3	-	-	1	-	-	-	3	3	3	3
		CO 2	Analyze simple systems in time domain.	3	3	3	3	3	-	-	1	-	-	-	3	3	3	3
		CO 3	Analyze simple systems in frequency domain.	3	3	3	3	3	-	-	1	-	-	-	3	3	3	3
		CO 4	: Infer the stability of systems in time and frequency domain.	3	3	3	3	3	-	-	1	-	-	-	3	3	3	3

		CO 5	Interpret characteristics of the system and find out solution for simple control problems.	3	3	3	3	3	-	-	1	-	-	-	3	3	3	3
		Avg.		3	3	3	3	3	-	-	1	-	-	-	3	3	3	3
21153C53	POWER ELECTRONICS	CO 1	Understand the operation of semiconductor devices and dynamic characteristics and to design &analyze the low power SMPS	3	3	3	3	-	-	2	1	-	-	3	3	3	3	3
		CO 2	Analyze the various uncontrolled rectifiers and design suitable filter circuits	3	3	3	3	-	-		1	-	-	-	-	3	3	3
		CO 3	Analyze the operation of the n-pulse converters and evaluate the performance	3	3	3	3	-	-	2	1	-	-	2	-	3	3	3
		CO 4	Understand various PWM techniques and apply voltage control and harmonic elimination methods to inverter circuits	3	3	3	3	-	-	1	1	-	-	2	3	3	3	3
		CO 5	Understand the operation of AC voltage controllers and its applications	3	3	3	3	-	-	1	1	-	-	2	3	3	3	3
		Avg.		3	3	3	3	-	-	1.5	1	-	-	2.25	3	3	3	3
21153E54A	UTILIZATION AND CONSERVATION OF ELECTRICAL ENERGY	CO 1	Ability to choose suitable electric drives for different applications	3	3	2	1	-	1	-	1.5	-				3	-	-
		CO 2	Ability to design the illumination systems for energy saving	2	1	3	-	-	-	-	1.5	-				3	-	-
		CO 3	Ability to demonstrate the utilization of electrical energy for heating and welding purposes	3	2	2	-	-	1	-	1.5	-				3	-	-
		CO 4	Ability to know the effective usage of solar and wind energies for electrical applications	1	2	3	-	-	-	-	1.5	-				3	-	-

		CO 5	Ability to do electric connection for any domestic appliance like refrigerator, batte charging circuit for a specific household application.	1	1	3	-	-	1	-	1.5	-				3	3	2
		CO 6	To illustrate the need for energy conservation and to simulate three phase pow control	3	3	3	-	-	-	-	1.5	-				3	3	3
		Avg		2.2	2	2.6	1	-	1	-	1.5	-				3	3	2.5
21153E55A	**SPECIAL ELECTRICAL MACHINES**	CO 1	Ability to model and analyze power electronic systems and equipment using computational software.	3	-	-	-	-	-	-	1	-	1	-	1	3	2	1
		CO 2	Ability to optimally design magnetics required in special machines based drive systems using FEM based software tools.	3	3	3	3	-	-	2	1	-	2	-	3	3	3	3
		CO 3	Ability to analyse the dynamic performance of special electrical machines	3	-	-	-	-	-	-	1	-	1	-	1	3	3	3
		CO 4	Ability to understand the operation and characteristics of other special electrical	3	3	3	3	-	-	-	1	-	3	-	3	3	3	3
		CO 5	Ability to design and conduct experiments towards research.	3	3	3	3	-	-	3	1	-	3	-	3	3	3	3
		Avg		3	3	3	3	3	-	2.5	1	-	2.2	-	2.3	3	2.8	2.6
21153E56D	**VLSI DESIGN**	CO 1	Develop CMOS design techniques	3	1	1	2	1	-	-	-	-	-	-	-	2	2	3
		CO 2	Learn and build IC fabrication	3	1	2	3	1	-	-	-	-	-	-	-	1	1	3
		CO 3	Explain the need of reconfigurable computing with PLDs	3	2	2	2	3	-	-	-	-	-	-	-	2	1	3
		CO 4	Design and development of reprogrammable FPGA.	3	2	2	2	3	-	-	-	-	-	-	-	2	2	3
		CO 5	Illustrate and develop HDL computational processes with improved design strategies.	3	2	1	3	3	-	-	-	1	-	-	-	2	2	3
		Avg		3	1.6	1.6	2.4	2.2	-	-	-	1	-	-	-	1.8	1.6	3

21147MC51D	DISASTER MANAGEMENT	**1**	To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR	3	3	2	3	-	-	2	2	-	-	2	-	2	-	1
		2	To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction	3	3	3	3	-	-	2	1	-	-	2	-	2	-	1
		3	To develop disaster response skills by adopting relevant tools and technology	3	3	3	3	-	-	2	2	-	-	-	-	2	-	1
		4	Enhance awareness of institutional processes for Disaster response in the country and	3	3	2	3	-	-	2	1	-	-	2	-	2	-	1
		5	Develop rudimentary ability to respond to their surroundings with potential Disaster response	3	3	2	3	-	-	2	2	-	-	2	-	3	-	1
		AVG		3	3	3	3	-	-	2	2	-	-	2	-	2	-	1
21153L57	CONTROL AND INSTRUMENTATION LABORATORY	CO 1	To model and analyze simple physical systems and simulate the performance in analog and digital platform.	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		CO 2	To design and implement simple controllers in standard forms.	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		CO 3	To design compensators based on time and frequency domain specifications.	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		CO 4	To design a complete closed control loop and evaluate its performance for simple physical systems.	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		CO 5	To analyze the stability of a physical system in both continuous and discrete domains.	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		Avg		3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
21153L58		CO 1	Determine the characteristics of SCR, IGBT, TRIAC, MOSFET and IGBT	3	3	3	3	3	-	-	1.5	-	-	-	3	3	3	3

	POWER ELECTRONICS LABORATORY	CO 2	Find the transfer characteristics of full converter, semi converter, step up and step down choppers by simulation experimentation.	3	3	3	3	3	-	-	1.5	-	-	-	3	3	3	3
		CO 3	Analyze the voltage waveforms for PWM inverter using various modulation techniques	3	3	3	3	3	-	-	1.5	-	-	-	3	3	3	3
		CO 4	Design and experimentally verify the performance of basic DC/DC converter topologies used for SMPS.	3	3	3	3	3	-	-	1.5	-	-	-	3	3	3	3
		CO 5	Understand the performance of AC voltage controllers by simulation and experimentation	3	3	3	3	3	-	-	1.5	-	-	-	3	3	3	3
		Avg		3	3	3	3	3	-	-	1.5	-	-	-	3	3	3	3
21150OE61A	**IOT CONCEPTS AND APPLICATIONS**	CO 1	Explain the concept of IoT.	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		CO 2	Understand the communication models and various protocols for IoT.	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		CO 3	Design portable IoT using Arduino/Raspberry Pi /open platform	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		CO 4	Apply data analytics and use cloud offerings related to IoT	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		CO 5	Analyze applications of IoT in real time scenario.	3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
		Avg		3	3	3	3	3	-	-	1.5	-	-	-	2	3	3	3
21153C62	POWER SYSTEM OPERATION AND CONTROL	CO 1	Understand the day – to – day operation of power system.	2	1	-	-	-	-	-	1	-	-	-	2	3	3	3
		CO 2	Model and analyse the control actions that are implemented to meet the minute-to-minute variation of system real power demand.	3	2	1	1	-	1	-	2	-	2	-	2	3	3	3

		CO 3	Model and analyze the compensators for reactive power control and various devices used for voltage control.	3	2	1	1	-	1	-	2	-	2	-	2	3	3	3
		CO 4	Prepare day ahead and real time economic generation scheduling.	3	2	1	1	-	1	-	2	-	2	-	2	3	1	2.33
		CO 5	Understand the necessity of computer control of power systems	2	1	-	-	-	-	-	1	-	2	-	2	3	3	3
		Avg.		2	1.6	1	1	-	1	-	1.6	-	2	-	2	3	2.2	2.86
21153C63	PROTECTION AND SWITCHGEAR	CO 1	Understand and select proper protective scheme and type of earthing.	3	1	1	2	1	2	1	1	1	1	2	-	3	1	-
		CO 2	Explain the operating principles of various relays.	3	1	1	2	1	2	1	1	1	1	2	-	3	1	-
		CO 3	Suggest suitable protective scheme for the protection of various power system apparatus.	3	1	1	2	1	2	1	1	1	1	2	-	3	2	-
		CO 4	Analyze the importance of static relays and numerical relays in power system protection.	3	1	1	2	1	2	1	1	1	1	2	-	3	2	1
		CO 5	Summarize the merits and demerits and application areas of various circuit breakers.	3	1	1	2	2	2	1	1	1	1	2	-	3	1	1
		Avg.		3	1	1	2	1.2	2	1	1	1	1	2	-	3	1.4	1
21153E64B	**POWER QUALITY**	CO 1	Use various definitions of power quality for power quality issues	3	3	3	3	-	-	3	3	-	3	-	3	3	3	3
		CO 2	Describe the concepts related with single phase / three phase, linear / nonlinear loads and single phase / three phase sinusoidal, non-sinusoidal source	3	3	3	3	-	-	3	3	-	3	-	3	3	3	3
		CO 3	Solve problems related with mitigation of Power System Harmonics	3	3	3	3	-	-	3	3	-	3	-	3	3	3	3
		CO 4	Use DSTATCOM for load compensation	3	3	3	3	-	-	3	3	-	3	-	3	3	3	3

		CO 5	Demonstrate the role of DVR, SAFs UPQC in power distribution systems	3	3	3	3	-	-	3	3	-	3	-	3	3	3	3
		Avg		3	3	3	3	-	-	3	3	-	3	-	3	3	3	3
21153E65A	**HVDC AND FACTS**	CO 1	To Identify and understand the problems in AC transmission systems and understand the need for Flexible AC transmission systems and HVDC Transmission	3	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		CO 2	To understand the operation and control of SVC and TCSC and its applications to enhance the stability and damping	2	3	1	2	3	-	-	-	-	-	-	-	2	3	3
		CO 3	To Analyze basic operation and control of voltage source converter based FACTS controllers	2	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		CO 4	To demonstrate basic operation and control of Line Commutated HVDC Transmission	3	3	1	2	3	-	-	-	-	-	-	-	2	3	3
		CO 5	To explain the d-q control based operation of VSC based HVDC Transmission	3	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		Avg		2.6	3	1	2.6	1.8	-	-	-	-	-	-	-	2	3	3
21153E66E	**HYBRID ENERGY TECHNOLOGY**	**CO 1**	Analyze the impacts of hybrid energy technologies on the environment and demonstrate them to harness electrical power.	3	3	3	2	-	-	-	-	-	3	-	3	3	3	3
		CO 2	Select a suitable Electrical machine for Wind Energy Conversion Systems and simulate wind energy conversion system	3	3	3	2	3	-	-	-	-	3	-	3	3	3	3
		CO 3	Design the power converters such as AC-DC, DC-DC, and AC-AC converters for SPV systems	3	3	3	2	3	-	-	-	-	3	-	3	3	3	3
		CO 4	Analyze the power converters such as AC-DC, DC-DC, and AC-AC converters for Hybrid energy systems	3	3	3	2	3	-	-	-	-	3	-	3	3	3	3

		CO 5	Interpret the hybrid renewable energy systems	3	3	3	2		-	-	-	-	3	-	3	3	3	3
		Avg		3	3	3	2	3	-	-	-	-	3	-	3	3	3	3
21153L67	**POWER SYSTEM LABORATORY**	CO 1	Model and analyze the performance of the transmission lines.	3	3	2	2	3	-	-	2	1	2	-	3	3	3	3
		CO 2	Perform power flow, short circuit, and stability analysis for any power system network	3	3	2	2	3	-	-	2	1	2	-	3	3	3	3
		CO 3	Understand, design, and analyze the load frequency control mechanism.	3	3	2	2	3	-	-	2	1	2	-	3	3	3	3
		CO 4	Perform optimal scheduling of generators and compute the state of the power system	3	3	2	2	3	-	-	2	1	2	-	3	3	3	3
		CO 5	Understand, analyze, and apply the relays for power system protection.	3	3	2	2	3	-	-	2	1	2	-	3	3	3	3
		Avg		3	3	2	2	3	-	-	2	1	2	-	3	3	3	3
21147S71	HUMAN VALUES AND ETHICS	CO 1	Identify the importance of democratic, secular and scientific values in harmonious functioning of social life	3	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		CO 2	Practice democratic and scientific values in both their personal and professional life.	2	3	1	2	3	-	-	-	-	-	-	-	2	3	3
		CO 3	Find rational solutions to social problems.	2	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		CO 4	Behave in an ethical manner in society	3	3	1	2	3	-	-	-	-	-	-	-	2	3	3
		CO 5	Practice critical thinking and the pursuit of truth.	3	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		Avg		2.6	3	1	2.6	1.8	-	-	-	-	-	-	-	2	3	3
21153C77	HIGH VOLTAGE ENGINEERING	CO 1	Explain various overvoltage's and its effects on power systems	2	2	-	-	-	-	-	-	-	-	-	-	3	2	-

		CO 2	Understand the breakdown phenomena in different medium under uniform and non-uniform fields	3	2	-	1	-	-	-	-	-	-	-	-	3		-
		CO 3	Explain the methods of generating	2	2	3	1	-	-	-	-	-	-	2	3	3	2	-
		CO 4	Suggest and Conduct suitable HV testing of Electrical power apparatus as per Standards	1	2	3	1	-	-	-	1	1	-		3	3	2	-
		CO 5	Explain the Industrial Applications of Electrostatic Fields.	2	2	1	-	-	2	-	-	-	-	2	-	3		2
		Avg.		2	2	2.33	1	-	2	-	1	1	-	2	3	3	2	2
21150OE74B	**DATA SCIENCE FUNDAMENTALS**	CO 1	Gain knowledge on data science process	3	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		CO 2	Perform data manipulation functions using Numpy and Pandas	2	3	1	2	3	-	-	-	-	-	-	-	2	3	3
		CO 3	Understand different types of machine learning approaches	2	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		CO 4	Perform data visualization using tools.	3	3	1	2	3	-	-	-	-	-	-	-	2	3	3
		CO 5	Handle large volumes of data in practical scenarios.	3	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		Avg.		2.6	3	1	2.6	1.8	-	-	-	-	-	-	-	2	3	3
21147OE73A	ENGLISH FOR COMPETITIVE EXAMINATIONS	CO 1	Expand their vocabulary and gain practical techniques to read and comprehend a wide range of texts with the emphasis required	3	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		CO 2	identify errors with precision and write with clarity and coherence	2	3	1	2	3	-	-	-	-	-	-	-	2	3	3
		CO 3	understand the importance of task fulfilment and the usage of task-appropriate vocabulary	2	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		CO 4	communicate effectively in group discussions, presentations and interviews	3	3	1	2	3	-	-	-	-	-	-	-	2	3	3

		CO 5	write topic based essays with precision and accuracy	3	3	1	3	1	-	-	-	-	-	-	-	2	3	3
		Avg.		2.6	3	1	2.6	1.8	-	-	-	-	-	-	-	2	3	3
21155OE74A	**GEOGRAPHICAL INFORMATION SYSTEM**		Have basic idea about the fundamentals of GIS.	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
			Understand the types of data models.	3		3	3	-	-	-	-	-	-	-	-	-	-	-
			Get knowledge about data input and topology	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
			Gain knowledge on data quality and standards	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
			Understand data management functions and data output	3	3	3	3	3	-	-	-	-	-	-	-	-	-	-
21160S75F	**PRINCIPLES OF MANAGEMENT**	**1**	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling.	3		-	-	-	1	-	-	-	-	-	-	2	1	1
		2	Have same basic knowledge on international aspect of management	-	1	1	-	-	-	-	-	-	-	-	-	2	1	-
		3	Ability to understand management concept of organizing.	1		-	2	-	-	1	-	2	-	1	1	-	-	2
		4	Ability to understand management concept of directing.	-	1	1	1	2	-	-	1	2	-	-	-	1	1	1
		5	Ability to understand management concept of controlling	1		-	-	1	1	-	-	-	3	-	1	1	-	1
		Avg.		1.66	1	1	1.5	1.5	1	1	1	2	3	1	1	1.5	1	1.25
21153E76B	**MULTILEVEL POWER CONVERTERS**	CO 1	Examine the different topologies of multilevel inverters (MLIs) with and without DC link capacitor.	3	2	2	3	-	-	2	1	-	3	-	3	3	3	3
		CO 2	Examine the performance of MLIs with Bipolar Pulse Width Modulation (PWM) Unipolar PWM Carrier-Based PWM Schemes Phase Level Shifted Multicarrier Modulation	3	2	2	3	-	-	2	1	-	3	-	3	3	3	3

		CO 3	Demonstrate the working principles of Cascaded H-Bridge MLI, diode clamped MLI, flying capacitor MLI and MLI with reduced switch count	3	2	2	3	-	-	2	1	-	3	-	3	3	3	3
		CO 4	Analyze the voltage balancing performance in Diode clamped MLI	3	3	3	3	-	-	2	1	-	3	-	3	3	3	3
		CO 5	Simulate three level, capacitor clamed and diode clamped MLI with R and RL load.	3	3	3	3	3	-	2	1	-	3	-	3	3	3	3
		CO 6	Simulate MLI with reduced switch configuration using fundamental switching scheme	3	3	3	3	3	-	2	1	-	3	-	3	3	3	3
		Avg		3	2.5	2.5	3	3	-	2	1	-	3	-	3	3	3	3
21153P81	PROJECT WORK / INTERNSHIP	CO 1	Ability to identify, formulate, design, interprete,analyze and provide solutions to complex engineering and societal issues by applying knowledge gained on basics of science and Enginnering	3	3	3	3	-	-	-	-	-	-	-	-	3	3	3
		CO 2	Ability to choose, conduct and demonstrate a sound technical knowledge of their selected project topics in the field of power components, protection, highvoltage, electronics, process automation, power electronics and drives instrumentation and control by exploring suitable engineering and IT tools	-	-	-	-	3	3	-	-	-	-	-	-	3	-	-
		CO 3	Ability to understand, formulate and propose new learning algorithms to solve engineering and societal problems of moderate complexity through multidisciplinary projectsunderstanding commitment towards sustainable development	-	-	-	-	-	-	3	-	3	-	-	-	-	-	3

		CO 4	Ability to demonstrate, prepare reports, communicate and work in a team as a member/leader by adhering to ethical responsibilities	-	-	-	-	-	-	-	3	3	3	3	-	-	-	3
		CO 5	Ability to acknowledge the value of continuing education for oneself and to stay up with technology advancements	-	-	-	-	-	-	-	-	-	-	-	3	3	3	3
		Avg.		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

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THANJAVUR – 613403 - TAMILNADU

DEPARTMENT OF CIVIL ENGINEERING

COURSE OBJECTIVE (R-2021)

B.TECH(F.T)-R-2021

SEM	COURSE CODE	TITLE OF THE COURSE	• COS
I	21147S11	Professional English - I	• Read articles of a general kind in magazines and newspapers.
			• Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
			• Comprehend conversations and short talks delivered in English.
I	21148S12	Matrices and Calculus	• Use both the limit definition and rules of differentiation to differentiate functions.
			• Apply differentiation to solve maxima and minima problems.
			• Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus.
			• Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
			• Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts.
			• Determine convergence/divergence of improper integrals and evaluate

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			convergent improper integrals.
I	21149S13	Engineering Physics	• the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics,
			• the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers,
			• the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and
			• the students will understand the basics of crystals, their structures and different crystal growth techniques.
I	21149S14	Engineering Chemistry	• The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.
I	21150S15	Problem Solving and Python Programming	• Develop algorithmic solutions to simple computational problems
			• Read, write, execute by hand simple Python programs.
			• Structure simple Python programs for solving problems.
			• Decompose a Python program into functions.
			• Represent compound data using Python lists, tuples, and dictionaries.
			• Read and write data from/to files in Python Programs.

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I	21150L16	Problem Solving and Python Programming Laboratory	• Develop algorithmic solutions to simple computational problems
			• Read, write, execute by hand simple Python programs.
			• Structure simple Python programs for solving problems.
			• Decompose a Python program into functions.
			• Represent compound data using Python lists, tuples, and dictionaries.
			• Read and write data from/to files in Python Programs.
I	21150L17	Physics and Chemistry Laboratory	• Upon completion of the course, the students will be able to apply principles of elasticity, optics and thermal properties for engineering applications.
			• The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters
II	21147S21	Professional English - II	• Upon completion of the course, the students will be able to
			• Apply principles of elasticity, optics and thermal properties for engineering applications
			• The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters
II	21148S22	Statistics and Numerical Methods	• Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
			• Gradient, divergence and curl of a

			vector point function and related identities.
			• Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
			• Analytic functions, conformal mapping and complex integration.
			• Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.
II	21149S23E	Physics for Civil Engineering	• the students will have knowledge on the thermal performance of buildings,
			• the students will acquire knowledge on the acoustic properties of buildings,
			• the students will get knowledge on various lighting designs for buildings,
			• the students will gain knowledge on the properties and performance of engineering materials, and
			• The students will understand the hazards of buildings.
II	21154S24	Engineering Graphics	• familiarize with the fundamentals and standards of Engineering graphics
			• Perform freehand sketching of basic geometrical constructions and multiple views of objects.
			• Project orthographic projections of lines and plane surfaces.
			• Draw projections and solids and development of surfaces.

			• Visualize and to project isometric and perspective sections of simple solids.
II	21153S25C	Basic Electrical and Electronics Engineering	• Ability to identify the electrical components and explain the characteristics of electrical machines.
			• ability to identify electronics components and understand the characteristics
II	21154L21	Engineering Practices Laboratory	• Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.
			• Public awareness of environmental is at infant stage.
			• Ignorance and incomplete knowledge has lead to misconceptions
			• Development and improvement in std. of living has lead to serious environmental disaster
II	21153L22D	Basic Electrical, Electronics And Instrumentation Engineering Laboratory	• Use experimental methods to verify the Ohm's law and Kirchhoff's Law and to measure three phase power
			• Analyze experimentally the load characteristics of electrical machines
			• Analyze the characteristics of basic electronic devices
			• Use LVDT to measure displacement
	21148S31D	Transforms and	• Understand how to solve the

III		Partial Differential Equations	given standard partial differential equations.
			• Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
			• Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
			• Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
			• Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems
III	21154S32	Engineering Mechanics	• illustrate the vectorial and scalar representation of forces and moments
			• analyse the rigid body in equilibrium
			• evaluate the properties of surfaces and solids
			• calculate dynamic forces exerted in rigid body
III	21155C33	Fluid Mechanics	• Get a basic knowledge of fluids in static, kinematic

			and dynamic equilibrium.
			• Understand and solve the problems related to equation of motion.
			• Gain knowledge about dimensional and model analysis.
			• Learn types of flow and losses of flow in pipes.
			• Understand and solve the boundary layer problems.
III	21155C34	Construction Materials and Technology	• Compare the properties of most common and advanced building materials.
			• understand the typical and potential applications of lime, cement and aggregates
			• Know the production of concrete and also the method of placing and making of concrete elements.
			• understand the applications of timbers and other materials
			• Understand the importance of modern material for construction.
III	21155C35	Water Supply & Wastewater Engineering	• an insight into the structure of drinking water supply systems, including water transport, treatment and distribution
			• the knowledge in various unit operations and processes in water treatment
			• an ability to design the various functional units in water treatment

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			• an understanding of water quality criteria and standards, and their relation to public health
			• the ability to design and evaluate water supply project alternatives on basis of chosen criteria
III	21155C36	Surveying and Levelling	• The use of various surveying instruments and mapping
			• Measuring Horizontal angle and vertical angle using different instruments
			• Methods of Levelling and setting Levels with different instruments
			• Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth
			• Concept and principle of modern surveying.
III	21155L37	Surveying and Levelling Laboratory	• Students completing this course would have acquired practical knowledge on handling basic survey instruments including Theodolite, Tacheometry, Total Station and GPS and have adequate knowledge to carryout Triangulation and Astronomical surveying including general field marking for various engineering projects and Location of site etc.
III	21155L38	Water and Wastewater	• Quantify the pollutant concentration in water and

		Analysis Laboratory	wastewater
			• Suggest the type of treatment required and amount of dosage required for the treatment
			• Examine the conditions for the growth of micro-organisms
III	21155L39	Professional Development	• Make effective presentations
			• Participate confidently in Group Discussions.
			• Attend job interviews and be successful in them.
			• Develop adequate Soft Skills required for the workplace
IV	21155C41	Applied Hydraulic Engineering	• Apply their knowledge of fluid mechanics in addressing problems in open channels.
			• Able to identify a effective section for flow in different cross sections.
			• To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.
			• Understand the principles, working and application of turbines.
IV	21155C42	Strength of Materials	• Understand the concepts of stress and strain, principal stresses and principal planes.
			• Determine Shear force and bending moment in beams and understand concept of

			theory of simple bending.
			• Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.
			• Apply basic equation of torsion in design of circular shafts and helical springs, .
			• Analyze the pin jointed plane and space trusses
IV	21155C43	Concrete Technology	• The various requirements of cement, aggregates and water for making concrete
			• The effect of admixtures on properties of concrete
			• The concept and procedure of mix design as per IS method
			• The properties of concrete at fresh and hardened state
IV	21155C44	Soil Mechanics	• Classify the soil and assess the engineering properties, based on index properties.
			• Understand the stress concepts in soils
			• Understand and identify the settlement in soils.
			• Determine the shear strength of soil
			• Analyze both finite and infinite slopes.
IV	21155C45	Highway and Railway Engineering	• Get knowledge on planning and aligning of highway.
			• Geometric design of highways
			• Design flexible and rigid pavements.

			• Gain knowledge on Highway construction materials, properties, testing methods
			• Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.
IV	21149S46	Environmental Sciences and Sustainability	• carry out scoping and screening of developmental projects for environmental and social assessments
			• explain different methodologies for environmental impact prediction and assessment
			• plan environmental impact assessments and environmental management plans
			• evaluate environmental impact assessment reports
			• carry out scoping and screening of developmental projects for environmental and social assessments
IV	21155L47	Hydraulic Engineering Laboratory	• Student knows the techniques to characterize various pavement materials through relevant tests.
IV	21155L48	Materials Testing Laboratory	• the students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.
IV	21155L49	Soil Mechanics Laboratory	• Students are able to conduct tests to determine both the

			index and engineering properties of soils and to characterize the soil based on their properties.
V	21155C51	Design of Reinforced Cement Concrete Elements	• Understand the various design methodologies for the design of RC elements.
			• Know the analysis and design of flanged beams by limit state method and sign of beams for shear, bond and torsion.
			• design the various types of slabs and staircase by limit state method.
			• Design columns for axial, uniaxial and biaxial eccentric loadings.
			• Design of footing by limit state method.
V	21155C52	Structural Analysis I	• Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method
			• Analyze the continuous beams and rigid frames by slope defection method.
			• Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.
			• Analyze the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.

			• Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.
V	21155C53	Foundation Engineering	• Understand the site investigation, methods and sampling.
			• Get knowledge on bearing capacity and testing methods.
			• Design shallow footings.
			• Determine the load carrying capacity, settlement of pile foundation.
			• Determine the earth pressure on retaining walls and analysis for stability.
V	21155E54A	Airports and Harbours	• Gain an insight on the planning and site selection of Airport Planning and design.
			• Knowledge on Design of various Airport components .
			• Analyze and design the elements for orientation of runways and passenger facility systems.
			• Understand the various features in Harbours and Ports
			• Knowledge on various Environmental Regulations and Acts
V	21155E54B	Concrete Structures	• Plan a layout of a structure
			• Calculate loads using IS codes and various computational tools

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			• Analyse the structure for various loads and load combination according to the relevant IS codes
			• Design and Analysis of structures using computer software/tools
			• Prepare the complete structural drawings using computer software
V	21155E54C	Groundwater Engineering	• Define the groundwater system basic, types of aquifers, aquifer parameters, movement and its potential for confined and unconfined aquifers
			• Apply the knowledge of groundwater flow in steady and unsteady flow characteristics of well hydraulics
			• Explain the concept of groundwater model development and data base management for groundwater management
			• Describe the importance of artificial recharge and groundwater quality concepts
			• Apply the creative and innovative technique on conservation of groundwater
V	21155E55A	Steel Structures	• Plan the layout of the structure and calculate the loads of the steel structure.
			• Select a load resisting system, model the structure and interpret the results.

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			• Design the various elements of a steel buildings
			• Design a typical industrial building
			• Design the various elements of a cold –formed steel buildings
	21155E55B	Air and Noise pollution Control Engineering	• Understand various types and sources of air pollution and its effects
			• Know the dispersion of air pollutants and their modeling
			• Know about the principles and design of control of particulate pollutants
			• Understand the principles and design of control of gaseous pollutant
			• Know the sources, effects and control of vehicular, indoor air and noise pollution
V	21155E55C	Rehabilitation/ Heritage Restoration	• Know the importance of inspection and maintenance
			• Study the Impacts of cracks, corrosion and climate on structures.
			• Know about various special concretes
			• Understand the testing techniques and various protection measures
			• Know the Repair of structures and Restoration of Heritage structures
V	21155E56A	Water Quality and Management	• Know about the principles of water quality modelling.

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			• Understand the pollutant transport phenomena in surface and groundwater.
			• Apply the knowledge of surface water quality modelling to predict the water quality of rivers, lakes and estuary.
			• Predict the groundwater contamination transport
			• Predict water quality of surface and sub surface water using numerical solution.
V	21155E56B	Prefabricated Structures	• Understand concepts about principles of prefabrication, production, transportation, erection
V	21155E56C	Total Station and GPS Surveying	• Acquire knowledge about panel systems, slabs, beams, shear walls and columns used in precast construction.
			• Acquire knowledge about design of cross section, joint flexibility.
			• Acquire knowledge about joints and connection in precast construction.
			• Acquire knowledge about structural stability.
			• Learn about the fundamental concept of Total station.
			• Provide knowledge about electromagnetic waves and its usage in Total station and GNSS.
			• Gain Knowledge on basic concepts of GNSS

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			• Understand the measuring and working principle of electro optical and Microwave Total station and GPS
			• Gain knowledge about Total station and GNSS data processing and Mapping.
V	21147MC51A	Introduction to Women and Gender Studies	• Gender and Representation in Alternative Media.
			• Gender and social media.
V	21147MC51B	Elements of Literature	• Students will be able to understand the relevance of literature in human life and appreciate its aspects in developing finer sensibilities.
V	21147MC51C	Film Appreciation	• the students will be introduced broadly to the development of film as an art and entertainment form.
			• The students will be taught as to how to read a film and appreciate the various nuances of a film as a text.
			• The students will be guided to study film joyfully.
V	21147MC51D	Disaster Management	• To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)
			• To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction.
			• To develop disaster response skills by adopting relevant tools and

			technology.
			• Enhance awareness of institutional processes for Disaster response in the country.
			• Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity
V	21155L58	Highway Engineering Laboratory	• Characterize Pavement Aggregate through relevant test.
			• Ascertain the Quality of Bitumen.
			• Determine the Optimum Binder Content Using Marshall Method.
			• Evaluate the Consistency and Properties of Bitumen.
			• Determine the Bitumen Content in the Bituminous Mixes
V	21155L59	Survey Camp	• Interpret the contours.
			• Work in a teamwork.
			• Mark a road alignment of (L-section, Cross-section) a given gradient connecting any two stations on the map
			• Calculate the earth work
			• Prepare a topographical plan of a given area
VI	21150OE61A	IoT Concepts and Applications (CSE)	• Explain the concept of IoT.
			• Understand the communication models and various protocols for IoT.

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			• Design portable IoT using Arduino/Raspberry Pi /open platform
			• Apply data analytics and use cloud offerings related to IoT.
			• Analyze applications of IoT in real time scenario.
VI	21150OE61B	Augmented and Virtual Reality (CSE)	• Understand the basic concepts of AR and VR
			• Understand the tools and technologies related to AR/VR
			• Know the working principle of AR/VR related Sensor devices
			• Design of various models using modeling techniques
			• Develop AR/VR applications in different domains
VI	21155C62	Design of Steel Structural Elements	• Understand the concepts of various design philosophies
			• Design common bolted and welded connections for steel structures
			• Design tension members and understand the effect of shear lag.
			• Understand the design concept of axially loaded columns and column base connections.
			• Understand specific problems related to the design of laterally restrained and unrestrained steel beams.

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VI	21155C63	Structural Analysis II	• Draw influence lines for statically determinate structures and calculate critical stress resultants.
			• Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.
			• Analyse of three hinged, two hinged and fixed arches.
			• Analyse the suspension bridges with stiffening girders
			• Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames.
` VI	21155C64	Hydrology and Water Resource Engineering	• Define the hydrological processes and their integrated behaviour in catchments
			• Apply the knowledge of hydrological processes to address basin characteristics, runoff and hydrograph
			• Explain the concept of hydrological extremes and its management strategies
			• Describe the principles of storage reservoirs
			• Understand and apply the concepts of groundwater management
VI	21155E65A	Prestressed Concrete Structures	• Design a prestressed concrete beam accounting for losses.
			• Design for flexure and shear

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			• Design the anchorage zone for post-tensioned members and estimate the deflection in beams.
			• Design composite members and continuous beams.
			• Design water tanks, pipes, poles and sleepers.
VI	21155E65B	Water Resources Systems Engineering	• Define the economic aspects and analysis of water resources systems for comprehensive and integrated planning of a water resources project.
			• Apply the concept of linear programming for optimisation of water resources problems.
			• Explain the concept of dynamic programming and apply in water resource system.
			• Develop the simulation model based on deterministic and stochastic simulation for reservoir operating policy
			• Apply advance optimisation techniques like goal programming, heuristic algorithm in the field of water resources planning and management.
VI	21155E65C	Remote Sensing Concepts	• Understand the concepts and laws related to remote sensing
			• Understand the interaction of electromagnetic radiation with atmosphere and earth

			material
			• Acquire knowledge about satellite orbits and different types of satellites
			• Understand the different types of remote sensors
			• Gain knowledge about the concepts of interpretation of satellite imagery
VI	21155E66A	Pile Foundation	• Explain the importance of pile foundation and various functions and responsibilities of geotechnical engineer and contractor, in addition to the piling equipments.
			• Determine the vertical load carrying capacity of pile and pile group- keeping the settlement of pile as an important criteria based on field practices and codal provisions.
			• Apart from vertically loaded piles, the structures are exposed to the peculiar pile subjected to lateral and uplift load with reference to codal provision and case studies.
			• Understand the design of pile and pile caps, considering the wind and seismic loads.
			• Explain the importance of caisson foundation and checking the stability of caissons based on codal provisions.

VI	21155E66B	Urban Planning and Development	• Understand the basic issues and meaning of terminologies in urban planning
			• Understand the different types of theories of urban planning and city development.
			• Understand the different types of plan, their strategies and their preparation process.
			• Comprehend the planning standards, evaluate the constraints and the financial mechanism
			• Knowledge on various town and country planning acts and their functions.
VI	21155E66C	Construction Equipment and Machinery	• Develop knowledge on planning of equipment and selection of equipment
			• Explain the knowledge on fundamentals of earth work operations, earth moving operations and types of earth work equipment
			• Develop the knowledge on special construction equipment
			• Apply the knowledge on asphalt and concrete plants
			• Apply the knowledge and select the proper materials handling equipment
VI	21155E67A	Advanced Construction Techniques	• Understand the modern construction techniques used in the sub structure construction.

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			• Demonstrate knowledge and understanding of the principles and concepts relevant to super structure construction for buildings
			• Understand the concepts used in the construction of special structures
			• Knowledge on Various strengthening and repair methods for different cases.
			• Identify the suitable demolition technique for demolishing a building.
VI	21155E67B	Traffic Engineering and Management	• Apply the knowledge of science and engineering fundamentals in conducting traffic surveys, analyze the problems and relating it with standards
			• Understand the principles of traffic flow characteristics and their relationships
			• Understand various traffic management measures in addressing the demand Pricing and ITS applications
			• Designing various types of control and regulatory measures to meet an efficient traffic network.
			• Understand various type of facilities and plan for Non Motorised Transport
VI	21155E67C	Dynamics and Earthquake Resistant Structures	• Develop the equations of motion for SDOF and MDOF system and to evaluate the natural frequencies and mode

			shapes
			• Explain the elements of engineering seismology, characteristics of earthquake and seismic instrumentation.
			• Explain the behavior of various types of structures under earthquake
			• Determine the forces in a structure due to earthquake
			• Design earthquake resistant building structures
VI	21147MC61A	Well Being with Traditional Practices	• Learn the importance of different components of health
			• Gain confidence to lead a healthy life
			• Learn new techniques to prevent lifestyle health disorders
			• Understand the importance of diet and workouts in maintaining health
VI	21147MC61B	History of Science and Technology in India	• The students will learn about history of science and technology in india.
VI	21147MC61C	Political and Economic Thought for a Humane Society	• The students will get an understanding of how societies are shaped by philosophy, political and economic system, how they relate to fulfilling human goals & desires with some case studies of how different attempts have been made in the past and how they have fared.
VI	21147MC61D	State, Nation Building And	• It is expected that this course will make students

		Politics in India	aware of the theoretical aspect of the state, its organs, its operationalization aspect, the background and philosophy behind the founding of the present political system, broad streams and challenges of national integration and nation-building in India.
VI	21147MC61E	Safety In Engineering Industries	• Understand the basic concept of safety.
			• Obtain knowledge of Statutory Regulations and standards.
			• Know about the safety Activities of the Working Place.
			• Analyze on the impact of Occupational Exposures and their Remedies
			• Obtain knowledge of Risk Assessment Techniques.
VI	21155L69	Building Drawing and Detailing Laboratory	• Draft the plan, elevation and sectional view of the load bearing and framed buildings
			• Draw the structural detailing of RCC elements
			• Draw the structural detailing of RCC water tanks, footings and retaining walls
			• Draw the structural detailing of steel structures
			• Draft the structural detailing of Industrial structures
	21147S71	Human Values and	• Identify the importance of

		Ethics	democratic, secular and scientific values in harmonious functioning of social life
			• Practice democratic and scientific values in both their personal and professional life.
			• Find rational solutions to social problems.
			• Behave in an ethical manner in society
			• Practice critical thinking and the pursuit of truth.
	21150OE72A	Data Science Fundamentals (CSE)	• Gain knowledge on data science process
			• Perform data manipulation functions using Numpy and Pandas.
			• Understand different types of machine learning approaches.
			• Perform data visualization using tools
			• Handle large volumes of data in practical scenarios.
	21150OE72B	Artificial Intelligence and Machine Learning Fundamentals	• Understand the basic concepts of AR and VR
			• Understand the tools and technologies related to AR/VR
			• Know the working principle of AR/VR related Sensor devices
			• Design of various models using modeling techniques
			• Develop AR/VR applications in different

			domains
	21147OE73A	English for Competitive Examinations	• expand their vocabulary and gain practical techniques to read and comprehend a wide range of texts with the emphasis required
			• identify errors with precision and write with clarity and coherence
			• understand the importance of task fulfilment and the usage of task-appropriate vocabulary
			• communicate effectively in group discussions, presentations and interviews
			• write topic based essays with precision and accuracy
	21153OE73A	Renewable Energy Technologies	• Discuss the Indian and global energy scenario.
			• Describe the various solar energy technologies and its applications.
			• Explain the various wind energy technologies.
			• Explore the various bio-energy technologies.
			• Discuss the ocean and geothermal technologies
	21153OE73B	Electric and Hybrid Vehicle	• Understand the operation and architecture of electric and hybrid vehicles
			• Identify various energy source options like battery and fuel cell
			• Select suitable electric motor for applications in hybrid and electric vehicles.

			• Explain the role of power electronics in hybrid and electric vehicles
			• Analyze the energy and design requirement for hybrid and electric vehicles.
	21154OE73A	Introduction to nonDestructive testing	• Realize the importance of NDT in various engineering fields
			• Have a basic knowledge of surface NDE techniques which enables to carry out various inspection in accordance with the established procedures.
			• Calibrate the instrument and inspect for in-service damage in the components by means of Eddy current testing as well as Thermography testing.
			• Differentiate various techniques of UT and AET and select appropriate NDT methods for better evaluation.
			• Interpret the results of Radiography testing and also have the ability to analyse the influence of various parameters on the testing.
	21154OE73B	Industrial Management	• Understand the basic concepts of industrial management
			• Identify the group conflicts and its causes.
			• Perform swot analysis
			• Analyze the learning curves

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			• Understand the placement and performance appraisa
	21152OE73A	Biomedical Instrumentation	• Students will learn about various kinds of biomolecules and their physiological role.
			• Students will gain knowledge about various metabolic disorders and will help them to know the importance of various biomolecules in terms of disease correlation.
	21152OE73B	Fundamentals of Electronic Devices and Circuits	• Explain the structure and working operation of basic electronic devices.
			• Design and analyze amplifiers.
			• Analyze frequency response of BJT and MOSFET amplifiers
			• Design and analyze feedback amplifiers and oscillator principles.
			• Design and analyze power amplifiers and supply circuits
	21154OE74A	Additive Manufacturing	• Recognize the development of AM technology and how AM technology propagated into various businesses and developing opportunities.
			• Acquire knowledge on process vat polymerization and material extrusion processes and its applications.
			• Elaborate the process and applications of powder bed

			fusion and binder jetting.
			• Evaluate the advantages, limitations, applications of material jetting and directed energy deposition processes.
			• Acquire knowledge on sheet lamination and direct write technology.
	21154OE74B	Industrial safety	• Describe, with example, the common work-related diseases and accidents in occupational setting
			• Name essential members of the Occupational Health team
			• What roles can a community health practitioners play in an Occupational setting to ensure the protection, promotion and maintenance of the health of the employee
	21153OE74A	Sensors	• Understand various sensor effects, sensor characteristics, signal types, calibration methods and obtain transfer function and empirical relation of sensors. They can also analyze the densor response.
			• Analyze and select suitable sensor for displacement, proximity and range measurement.
			• Analyze and select suitable sensor for force, magnetic field, speed, position and direction measurement.
			• Analyze and Select suitable

			sensor for light detection, pressure and temperature measurement and also familiar with other miniaturized smart sensors.
			• Select and design suitable signal conditioning circuit with proper compensation and linearizing element based on sensor output signal.
	21153OE74B	Electrical, Electronic and Magnetic materials	• Understand various types of dielectric materials, their properties in various conditions.
			• Evaluate magnetic materials and their behavior
			• Evaluate semiconductor materials and technologies.
			• Select suitable materials for electrical engineering applications.
			• Identify right material for optical and optoelectronic applications
			• Describe the concepts of wearable system.
			• Explain the energy harvestings in wearable device
			• Use the concepts of BAN in health care.
			• Illustrate the concept of smart textile
			• Compare the various wearable devices in healthcare system
	21152OE77B	Medical Informatics	• Explain the structure and functional capabilities of

			Hospital Information System.
			• Describe the need of computers in medical imaging and automated clinical laboratory.
			• Articulate the functioning of information storage and retrieval in computerized patient record system.
			• Apply the suitable decision support system for automated clinical diagnosis.
			• Discuss the application of virtual reality and telehealth technology in medical industry.
	21155C75	Estimation , Costing & Valuation Engineering	• Estimate the quantities for buildings,
			• Rate Analysis for all Building works, canals, and Roads and Cost Estimate.
			• Understand types of specifications, principles for report preparation, tender notices types.
			• Gain knowledge on types of contracts
			• Evaluate valuation for building and land.
	21149S46	Environmental Sciences and Sustainability	• carry out scoping and screening of developmental projects for environmental and social assessments
			• explain different methodologies for environmental impact prediction and assessment

			• plan environmental impact assessments and environmental management plans
			• evaluate environmental impact assessment reports
	21160S77	Total quality management	• The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
			• Development of critical thinking and synergistic research approach.
VIII	21155PW81	Project Work	• On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

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DEPARTMENT OF CIVIL ENGINEERING
1.1.1 -CO-PO-PSO MAPPING

B.TECH (F.T)- 2021R

Sem	Course Code	Title of the Course	COs	POS										PSO		
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3
SEM 1	21147S11	Professional English - I	To use appropriate words in a professional context	3	3	3	3	1	3	3	3	3	3	3	3	-
			To gain understanding of basic grammatical structures and use them in right context.	3	3	3	3	1	3	3	3	3	3	3	3	-
			To read and infer the denotative and connotative meanings of technical texts	3	3	3	3	1	3	3	3	3	3	3	3	-
			To read and interpret information presented in tables, charts and other graphic forms	3	3	3	3	1	3	3	3	3	3	3	3	-
			To write definitions, descriptions, narrations and essays on various topics	3	3	3	3	1	3	3	3	3	3	3	3	-
			AVG	**3**	**3**	**3**	**3**	**1**	**3**	**3**	**3**	**3**	**3**	**3**	**3**	**-**
	21148S12	Matrices and Calculus	Use the matrix algebra methods for solving practical problems	3	3	1	1	0	0	0	0	2	0	2	3	-
			Apply differential calculus tools in solving various application problems.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Able to use differential calculus ideas on several variable functions.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Apply different methods of integration in solving practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-

		Apply multiple integral ideas in solving areas, volumes and other practical problems.	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21149S13	Engineering Physics	Understand the importance of mechanics.	1	1	1	1	1	3	3	3	1	3	-	3	-
		Express their knowledge in electromagnetic waves.	1	1	1	1	1	3	3	3	1	3	-	3	-
		Demonstrate a strong foundational knowledge in oscillations, optics and lasers.	2	3	2	3	2	3	3	3	2	3	3	3	-
		Demonstrate a strong foundational knowledge in oscillations, optics and lasers.	2	3	2	3	2	3	3	3	2	3	3	3	-
		Comprehend and apply quantum mechanical principles towards the formation of energy bands.	2	3	3	3	-	3	3	3	2	3	-	3	-
		AVg	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	-
21149S14	Engineering Chemistry	To infer the quality of water from quality parameter data and propose suitable treatment methodologies to treat water.	1	1	1	1	1	3	3	3	1	3	-	3	-
		identify and apply basic concepts of nanoscience and nanotechnology in designing the synthesis of nanomaterials for engineering and technology applications.	1	1	1	1	1	3	3	3	1	3	-	3	-
		To apply the knowledge of phase rule and composites for material selection requirements.	2	3	2	3	2	3	3	3	2	3	3	3	-
		To recommend suitable fuels for engineering processes and applications.	2	3	2	3	2	3	3	3	2	3	3	3	-
		To recognize different forms of energy resources and apply them for suitable applications in energy sectors.	2	3	3	3	-	3	3	3	2	3	-	3	-
		AVg	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	-
21150S15	Problem Solving and Python Programming	Develop algorithmic solutions to simple computational problems	3	3	1	1	0	0	0	0	2	0	2	3	-
		Read, write, execute by hand simple Python programs.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Structure simple Python programs for solving problems.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Decompose a Python program into functions.	3	3	1	1	0	0	0	0	2	0	2	3	-

			Represent compound data using Python lists, tuples, and dictionaries.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Read and write data from/to files in Python Programs.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21150L16	Problem Solving and Python Programming Laboratory	Develop algorithmic solutions to simple computational problems	1	1	1	1	1	3	3	3	1	3	-	3	-
			Develop and execute simple Python programs.	1	1	1	1	1	3	3	3	1	3	-	3	-
			Implement programs in Python using conditionals and loops for solving problems.	1	1	1	1	1	3	3	3	1	3	-	3	-
			Deploy functions to decompose a Python program.	2	3	2	3	2	3	3	3	2	3	3	3	-
			Process compound data using Python data structures.	2	3	2	3	2	3	3	3	2	3	3	3	-
			Utilize Python packages in developing software applications.	2	3	3	3	-	3	3	3	2	3	-	3	-
			AVg	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	-
	21150L17	Physics and Chemistry Laboratory	Understand the functioning of various physics laboratory equipment.	3	2	2	1	-	1	1	-	-	-	-	1	-
			Use graphical models to analyze laboratory data.	2	-	-	1	-	2	2	-	-	-	-	-	-
			Use mathematical models as a medium for quantitative reasoning and describing physical reality.	3	1	-	-	-	-	-	-	-	-	-	-	-
			Access, process and analyze scientific information.	3	1	1	-	-	1	2	-	-	-	-	-	-
			Solve problems individually and collaboratively.	3	1	2	1	-	2	2	-	-	-	-	2	-
			AVg	**2.8**	**1.3**	**1.6**	**1**	-	**1.5**	**1.8**	-		-	-	**1.5**	-
SEM 2	21147S21	Professional English - II	To compare and contrast products and ideas in technical texts.	3	3	1	1	0	0	0	0	2	0	2	3	-
			To identify and report cause and effects in events, industrial processes through technical texts	3	3	1	1	0	0	0	0	2	0	2	3	-
			To analyse problems in order to arrive at feasible solutions and communicate them in the written format.	3	3	1	1	0	0	0	0	2	0	2	3	-
			To present their ideas and opinions in a planned and logical manner	3	3	1	1	0	0	0	0	2	0	2	3	-
			To draft effective resumes in the context of job search.	3	3	1	1	0	0	0	0	2	0	2	3	-

			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21148S22	Statistics and NumericalMethods	Apply the concept of testing of hypothesis for small and large samples in real life problems.	3	2	2	1	-	1	1	-	-	-	-	1	-
			Apply the basic concepts of classifications of design of experiments in the field of agriculture.	2	-	-	1	-	2	2	-	-	-	-	-	-
			Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.	3	1	-	-	-	-	-	-	-	-	-	-	-
			Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.	3	1	1	-	-	1	2	-	-	-	-	-	-
			Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.	3	1	2	1	-	2	2	-	-	-	-	2	-
			AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
	21149S23E	Physics for Civil Engineering	acquire knowledge about heat transfer through different materials, thermal performance of building and thermal insulation.	3	3	1	1	0	0	0	0	2	0	2	3	-
			gain knowledge on the ventilation and air conditioning of buildings	3	3	1	1	0	0	0	0	2	0	2	3	-
			understand the concepts of sound absorption, noise insulation and lighting designs	3	3	1	1	0	0	0	0	2	0	2	3	-
			now about the processing and applications of composites, metallic glasses, shape memory alloys and ceramics	3	3	1	1	0	0	0	0	2	0	2	3	-
			get an awareness on natural disasters such as earth quake, cyclone, fire and safety measures	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21154S24	Engineering Graphics	Use BIS conventions and specifications for engineering drawing.	1	1	1	1	1	3	3	3	1	3	-	3	-
			Construct the conic curves, involutes and cycloid.	1	1	1	1	1	3	3	3	1	3	-	3	-
			Solve practical problems involving projection of lines.	2	3	2	3	2	3	3	3	2	3	3	3	-
			Draw the orthographic, isometric and perspective projections of simple solids.	2	3	2	3	2	3	3	3	2	3	3	3	-
			Draw the development of simple solids.	2	3	3	3	-	3	3	3	2	3	-	3	-

			AVg	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	-
	21153S25C	Basic Electrical,Electronics and Instrument Engineering	Compute the electric circuit parameters for simple problems	1	1	1	1	1	3	3	3	1	3	-	3	-
			Explain the concepts of domestics wiring and protective devices	1	1	1	1	1	3	3	3	1	3	-	3	-
			Explain the working principle and applications of electrical machines	2	3	2	3	2	3	3	3	2	3	3	3	-
			Analyze the characteristics of analog electronic devices	2	3	2	3	2	3	3	3	2	3	3	3	-
			Explain the types and operating principles of sensors and transducers	2	3	3	3	-	3	3	3	2	3	-	3	-
			AVg	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	-
	21154L21	Engineering Practices Laboratory	Draw pipe line plan; lay and connect various pipe fittings used in common household plumbing work; Saw; plan; make joints in wood materials used in common household wood work.	3	3	1	1	0	0	0	0	2	0	2	3	-
			various electrical joints in common household electrical wire work.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Wire various electrical joints in common household electrical wire work.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Weld various joints in steel plates using arc welding work; Machine various simple processes like turning, drilling, tapping in parts; Assemble simple mechanical assembly of common household equipments; Make a tray out of metal sheet using sheet metal work.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21153L22D	Basic Electrical, Electronics And Instrumentation Engineering Laboratory	Use experimental methods to verify the Ohm's law and Kirchhoff's Law and to measure three phase power	3	3	2	1	2	1	-	-	-	-	-	-	-
			Analyze experimentally the load characteristics of electrical machines	3	3	2	2	2	1	-	-	-	-	-	1	-
			Analyze the characteristics of basic electronic devices	3	3	1	1	2	1	-	-	-	-	-	-	-
			Use LVDT to measure displacement	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
SEM 3	21148S31D	Transforms and Partial Differential	Understand how to solve the given standard partial differential equations.	1	1	1	1	1	3	3	3	1	3	-	3	-

	Equations	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.	1	1	1	1	1	3	3	3	1	3	-	3	-
		Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.	2	3	2	3	2	3	3	3	2	3	3	3	-
		Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.	2	3	2	3	2	3	3	3	2	3	3	3	-
		Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems	2	3	3	3	-	3	3	3	2	3	-	3	-
		AVg	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	**-**
21154S32	Engineering Mechanics	Illustrate the vectorial and scalar representation of forces and moments	1	1	1	1	1	3	3	3	1	3	-	3	-
		Analyse the rigid body in equilibrium	1	1	1	1	1	3	3	3	1	3	-	3	-
		Evaluate the properties of distributed forces	2	3	2	3	2	3	3	3	2	3	3	3	-
		Determine the friction and the effects by the laws of friction	2	3	2	3	2	3	3	3	2	3	3	3	-
		Calculate dynamic forces exerted in rigid body	2	3	3	3	-	3	3	3	2	3	-	3	-
		AVg	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	**-**
21155C33	Fluid Mechanics	Demonstrate the difference between solid and fluid, its properties and behaviour in static conditions.	3	2	2	1	-	1	1	-	-	-	-	1	-
		Apply the conservation laws applicable to fluids and its application through fluid kinematics and dynamics.	2	-	-	1	-	2	2	-	-	-	-	-	-
		Formulate the relationship among the parameters involved in the given fluid phenomenon and to predict the performance of prototypes by model studies.	3	1	-	-	-	-	-	-	-	-	-	-	-
		Estimate the losses in pipelines for both laminar and turbulent conditions and analysis of pipes connected in series and parallel.	3	1	1	-	-	1	2	-	-	-	-	-	-
		Explain the concept of boundary layer and its application to find the drag force excreted by the fluid on the flat solid surface.	3	1	2	1	-	2	2	-	-	-	-	2	-

		AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
21155C34	Construction Materials andTechnology	Perform formulations of projects.	1	1	1	1	1	3	3	3	1	3	-	3	-
		Analyze project costing.	1	1	1	1	1	3	3	3	1	3	-	3	-
		Identify and estimate the activity in the construction.	2	3	2	3	2	3	3	3	2	3	3	3	-
		Develop the knowledge on accidents and their causes.	2	3	2	3	2	3	3	3	2	3	3	3	-
		Plan, assess, analyze and manage the construction project sites.	2	3	3	3	-	3	3	3	2	3	-	3	-
		AVg	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	**-**
21155C35	Water Supply & Wastewater Engineering	Understand the various components of water supply scheme and design of intake structure and conveyance system for water transmission	3	3	2	2	2	1	-	-	-	-	-	1	-
		Understand on the characteristics and composition of sewage, ability to estimate sewage generation and design sewer system including sewage pumping stations	3	3	1	1	2	1	-	-	-	-	-	-	-
		Understand the process of conventional treatment and design of water and wastewater treatment system and gain knowledge of selection of treatment process and biological treatment process	3	3	1	1	2	1	-	-	-	-	-	-	-
		AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
		Ability to design and evaluate water distribution system and water supply in buildings and understand the self-purification of streams and sludge and septage disposal methods.	3	3	1	1	2	1	-	-	-	-	-	-	-
		Able to understand and design the various advanced treatment system and knowledge about the recent advances in water and wastewater treatment process and reuse of sewage	3	3	1	1	2	1	-	-	-	-	-	-	-
		AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
21155C36	Surveying and Levelling	Measuring Horizontal angle and vertical angle using different instruments	3	3	2	1	2	1	-	-	-	-	-	-	-
		Methods of Levelling and setting Levels with different instruments	3	3	2	2	2	1	-	-	-	-	-	1	-
		Concepts of astronomical surveying and methods to determine time, longitude, latitude and azimuth	3	3	1	1	2	1	-	-	-	-	-	-	-
		Concept and principle of modern	3	3	1	1	2	1	-	-	-	-	-	-	-

			surveying.															
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21155L37	Surveying and Levelling Laboratory	Impart knowledge on the usage of basic surveying instruments like chain/tape, compass and levelling instruments	3	3	1	1	0	0	0	0	2	0	2	3	-
			Able to use levelling instrument for surveying operations	3	3	1	1	0	0	0	0	2	0	2	3	-
			Able to use theodolite for various surveying operations	3	3	1	1	0	0	0	0	2	0	2	3	-
			Able to carry out necessary surveys for social infrastructures	3	3	1	1	0	0	0	0	2	0	2	3	-
			Quantify the pollutant concentration in water and wastewater	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155L38	Water and Wastewater Analysis Laboratory	Suggest the type of treatment required and amount of dosage required for the treatment	3	3	1	1	0	0	0	0	2	0	2	3	-
			Examine the conditions for the growth of micro-organisms	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155L39	Professional Development	Make effective presentations	1	1	1	1	1	3	3	3	1	3	-	3	-
			Participate confidently in Group Discussions.	1	1	1	1	1	3	3	3	1	3	-	3	-
			Attend job interviews and be successful in them.	2	3	2	3	2	3	3	3	2	3	3	3	-
			Develop adequate Soft Skills required for the workplace	2	3	2	3	2	3	3	3	2	3	3	3	-
			AVg	2	3	3	3	-	3	3	3	2	3	-	3	-
SEM 4	21155C41	Applied Hydraulic Engineering	Apply their knowledge of fluid mechanics in addressing problems in open channels.	**1.6**	**2.2**	**1.8**	**2.2**	**1.5**	**3**	**3**	**3**	**1.6**	**3**	**3**	**3**	**-**
			Able to identify a effective section for flow in different cross sections.	3	3	1	1	0	0	0	0	2	0	2	3	-
			To solve problems in uniform, gradually and rapidly varied flows in steady state conditions.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the principles, working and application of turbines.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the principles, working and application of pumps.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155C42	Strength of Materials	Understand the concepts of stress and strain, principal stresses and principal planes.	3	2	2	1	-	1	1	-	-	-	-	1	-
			Determine Shear force and bending moment in beams and understand concept of theory of simple bending.	2	-	-	1	-	2	2	-	-	-	-	-	-

			Calculate the deflection of beams by different methods and selection of method for determining slope or deflection.	3	1	-	-	-	-	-	-	-	-	-	-	-
			Apply basic equation of torsion in design of circular shafts and helical springs, .	3	1	1	-	-	1	2	-	-	-	-	-	-
			Analyze the pin jointed plane and space trusses	3	1	2	1	-	2	2	-	-	-	-	2	-
			AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
	21155C43	Concrete Technology	The various requirements of cement, aggregates and water for making concrete	3	3	1	1	0	0	0	0	2	0	2	3	-
			The effect of admixtures on properties of concrete	3	3	1	1	0	0	0	0	2	0	2	3	-
			The concept and procedure of mix design as per IS method	3	3	1	1	0	0	0	0	2	0	2	3	-
			The properties of concrete at fresh and hardened state	3	3	1	1	0	0	0	0	2	0	2	3	-
			The importance and application of special concretes.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155C44	Soil Mechanics Laboratory	Classify the soil and assess the engineering properties, based on index properties.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the stress concepts in soils	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand and identify the settlement in soils.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Determine the shear strength of soil	3	3	1	1	0	0	0	0	2	0	2	3	-
			Analyze both finite and infinite slopes.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155C45	Highway and Railway Engineering`	Get knowledge on planning and aligning of highway.	3	3	3	3	2	-	-	-	-	-	2	2	3
			Geometric design of highways	3	3	3	3	2	-	-	-	-	-	2	2	3
			Design flexible and rigid pavements.	3	3	3	3	2	-	-	-	-	-	2	-	3
			Gain knowledge on Highway construction materials, properties, testing methods	2	2	-	2	2	-	-	-	-	-	1	-	3
			Understand the concept of pavement management system, evaluation of distress and maintenance of pavements.	1	2	-	-	1	-	-	-	-	-	1	-	2
			Get to know types of grouts and grouting technique.	2	2	-	-	2	-	-	-	-	-	1	-	2
			AVg	**2**	**3**	**3**	**3**	**2**	-	-	-	-	-	**2**	**2**	**3**
	21149S46	Environmental Sciences and Sustainabilit	carry out scoping and screening of developmental projects for environmental and social assessments	3	3	2	1	2	1	-	-	-	-	-	-	-

		y	explain different methodologies for environmental impact prediction and assessment	3	3	2	2	2	1	-	-	-	-	-	1	-
			plan environmental impact assessments and environmental management plans	3	3	1	1	2	1	-	-	-	-	-	-	-
			evaluate environmental impact assessment reports	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21155L47	Hydraulic Engineering Laboratory	Student knows the techniques to characterize various pavement materials through relevant tests.	3	3	2	1	2	1	-	-	-	-	-	-	-
	21155L48	Materials Testing Laboratory	the students will have the required knowledge in the area of testing of construction materials and components of construction elements experimentally.	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155L49	Soil Mechanics Laboratory	Students are able to conduct tests to determine both the index and engineering properties of soils and to characterize the soil based on their properties.	3	3	1	1	0	0	0	0	2	0	2	3	-
SEM 5	21155C51	Design of Reinforced Cement Concrete Elements	Understand the various design methodologies for the design of RC elements.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Know the analysis and design of flanged beams by limit state method and sign of beams for shear, bond and torsion.	3	3	1	1	0	0	0	0	2	0	2	3	-
			design the various types of slabs and staircase by limit state method.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design columns for axial, uniaxial and biaxial eccentric loadings.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design of footing by limit state method.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155C52	Structural Analysis I	Analyze continuous beams, pin-jointed indeterminate plane frames and rigid plane frames by strain energy method	3	3	1	1	0	0	0	0	2	0	2	3	-
			Analyze the continuous beams and rigid frames by slope defection method.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the concept of moment distribution and analysis of continuous beams and rigid frames with and without sway.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Analyze the indeterminate pin jointed plane frames continuous beams and rigid frames using matrix flexibility method.	3	3	1	1	0	0	0	0	2	0	2	3	-

		Understand the concept of matrix stiffness method and analysis of continuous beams, pin jointed trusses and rigid plane frames.	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21155C53	Foundation Engineering	Get knowledge on bearing capacity and testing methods.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Design shallow footings.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Determine the load carrying capacity, settlement of pile foundation.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Determine the earth pressure on retaining walls and analysis for stability.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Determine the earth pressure on retaining walls and analysis for stability.	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21155E54 A	Airports and Harbours	Gain an insight on the planning and site selection of Airport Planning and design.	3	2	2	1	-	1	1	-	-	-	-	1	-
		Knowledge on Design of various Airport components.	2	-	-	1	-	2	2	-	-	-	-	-	-
		Analyze and design the elements for orientation of runways and passenger facility systems.	3	1	-	-	-	-	-	-	-	-	-	-	-
		Understand the various features in Harbours and Ports	3	1	1	-	-	1	2	-	-	-	-	-	-
		Knowledge on various Environmental Regulations and Acts	3	1	2	1	-	2	2	-	-	-	-	2	-
		AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	-
21155E54 B	Concrete Structures	Plan a layout of a structure	3	3	1	1	0	0	0	0	2	0	2	3	-
		Calculate loads using IS codes and various computational tools	3	3	1	1	0	0	0	0	2	0	2	3	-
		Analyse the structure for various loads and load combination according to the relevant IS codes	3	3	1	1	0	0	0	0	2	0	2	3	-
		Design and Analysis of structures using computer software/tools	3	3	1	1	0	0	0	0	2	0	2	3	-
		Prepare the complete structural drawings using computer software	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21155E54 C	Groundwater Engineering	Define the groundwater system basic, types of aquifers, aquifer parameters, movement and its potential for confined and unconfined aquifers	3	2	2	1	-	1	1	-	-	-	-	1	-
		Apply the knowledge of groundwater flow in steady and unsteady flow characteristics of	2	-	-	1	-	2	2	-	-	-	-	-	-

		well hydraulics													
		Explain the concept of groundwater model development and data base management for groundwater management	3	1	-	-	-	-	-	-	-	-	-	-	-
		Describe the importance of artificial recharge and groundwater quality concepts	3	1	1	-	-	1	2	-	-	-	-	-	-
		Apply the creative and innovative technique on conservation of groundwater	3	1	2	1	-	2	2	-	-	-	-	2	-
		AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
21155E55A	Steel Structures	Recognize the design philosophy of steel structures and identify the different failure modes of bolted and welded connections, and determine their design strengths	3	2	2	1	-	1	1	-	-	-	-	1	-
		Select the most suitable section shape and size for tension and compression members and beams according to specific design criteria	2	-	-	1	-	2	2	-	-	-	-	-	-
		Apply the principles, procedures and current code requirements to the analysis and design of steel tension members, columns, column bases and beams	3	1	-	-	-	-	-	-	-	-	-	-	-
		Identify and compute the design loads on Industrial structures, and gantry girder	3	1	1	-	-	1	2	-	-	-	-	-	-
		Find out ultimate load of steel beams and portal frames using plastic analysis	3	1	2	1	-	2	2	-	-	-	-	2	-
		AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
21155E55C	Rehabilitation/ Heritage Restoration	Know the importance of inspection and maintenance	3	2	2	1	-	1	1	-	-	-	-	1	-
		Study the Impacts of cracks, corrosion and climate on structures.	2	-	-	1	-	2	2	-	-	-	-	-	-
		Know about various special concretes	3	1	-	-	-	-	-	-	-	-	-	-	-
		Understand the testing techniques and various protection measures	3	1	1	-	-	1	2	-	-	-	-	-	-
		Know the Repair of structures and Restoration of Heritage structures	3	1	2	1	-	2	2	-	-	-	-	2	-
		AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
21155E56A	Water Quality and	Know about the principles of water quality modelling	3	2	2	1	-	1	1	-	-	-	-	1	-

	Management	Understand the pollutant transport phenomena in surface and groundwater.	2	-	-	1	-	2	2	-	-	-	-	-	-
		Apply the knowledge of surface water quality modelling to predict the water quality of rivers, lakes and estuary.	3	1	-	-	-	-	-	-	-	-	-	-	-
		Predict the groundwater contamination transport	3	1	1	-	-	1	2	-	-	-	-	-	-
		Predict water quality of surface and sub surface water using numerical solution.	3	1	2	1	-	2	2	-	-	-	-	2	-
		AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
21155E56B	Prefabricated Structures	Understand concepts about principles of prefabrication, production, transportation, erection	3	3	1	1	0	0	0	0	2	0	2	3	-
		Acquire knowledge about panel systems, slabs, beams, shear walls and columns used in precast construction.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Acquire knowledge about design of cross section, joint flexibility.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Acquire knowledge about joints and connection in precast construction.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Acquire knowledge about structural stability.	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21155E56C	Total Station and GPS Surveying	Learn about the fundamental concept of Total station.	3	2	2	1	-	1	1	-	-	-	-	1	-
		Provide knowledge about electromagnetic waves and its usage in Total station and GNSS.	2	-	-	1	-	2	2	-	-	-	-	-	-
		Gain Knowledge on basic concepts of GNSS	3	1	-	-	-	-	-	-	-	-	-	-	-
		Understand the measuring and working principle of electro optical and Microwave Total station and GPS	3	1	1	-	-	1	2	-	-	-	-	-	-
		Gain knowledge about Total station and GNSS data processing and Mapping.	3	1	2	1	-	2	2	-	-	-	-	2	-
		AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
21147MC51A	Introduction to Women and Gender Studies	Gender and Representation in Alternative Media.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Gender and social media.	3	3	1	1	0	0	0	0	2	0	2	3	-
21147MC51B	Elements of Literature	Students will be able to understand the relevance of literature in human life and appreciate its aspects in developing finer sensibilities.	3	3	1	1	0	0	0	0	2	0	2	3	-

		the students will be introduced broadly to the development of film as an art and entertainment form.	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21147MC 51C	Film Appreciation	the students will be introduced broadly to the development of film as an art and entertainment form.	3	3	1	1	0	0	0	0	2	0	2	3	-
		The students will be taught as to how to read a film and appreciate the various nuances of a film as a text	3	3	1	1	0	0	0	0	2	0	2	3	-
		The students will be guided to study film joyfully.	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21147MC 51D	Disaster Management	To impart knowledge on the concepts of Disaster, Vulnerability and Disaster Risk reduction (DRR)	3	3	1	1	0	0	0	0	2	0	2	3	-
		To enhance understanding on Hazards, Vulnerability and Disaster Risk Assessment prevention and risk reduction.	3	3	1	1	0	0	0	0	2	0	2	3	-
		To develop disaster response skills by adopting relevant tools and technology.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Enhance awareness of institutional processes for Disaster response in the country.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Develop rudimentary ability to respond to their surroundings with potential Disaster response in areas where they live, with due sensitivity	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21155L58	Highway Engineering Laboratory	Characterize Pavement Aggregate through relevant test.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Ascertain the Quality of Bitumen.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Determine the Optimum Binder Content Using Marshall Method.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Evaluate the Consistency and Properties of Bitumen.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Determine the Bitumen Content in the Bituminous Mixes	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
21155L59	Survey Camp	Interpret the contours.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Work in a teamwork.	3	3	1	1	0	0	0	0	2	0	2	3	-
		Mark a road alignment of (L-section, Cross-section) a given gradient connecting any two stations on the map	3	3	1	1	0	0	0	0	2	0	2	3	-
		Calculate the earth work	3	3	1	1	0	0	0	0	2	0	2	3	-
		Prepare a topographical plan of a given area	3	3	1	1	0	0	0	0	2	0	2	3	-
		AVg	3	3	1	1	0	0	0	0	2	0	2	3	-

SEM 6	21150OE 61A	IoT Concepts and Applications (CSE)	Explain the concept of IoT.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the communication models and various protocols for IoT.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design portable IoT using Arduino/Raspberry Pi /open platform	3	3	1	1	0	0	0	0	2	0	2	3	-
			Apply data analytics and use cloud offerings related to IoT.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Analyze applications of IoT in real time scenario.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21150OE 61B	Augmented and Virtual Reality (CSE)	Understand the basic concepts of AR and VR	3	2	2	1	-	1	1	-	-	-	-	1	-
			Understand the tools and technologies related to AR/VR	2	-	-	1	-	2	2	-	-	-	-	-	-
			Know the working principle of AR/VR related Sensor devices	3	1	-	-	-	-	-	-	-	-	-	-	-
			Design of various models using modeling techniques	3	1	1	-	-	1	2	-	-	-	-	-	-
			Develop AR/VR applications in different domains	3	1	2	1	-	2	2	-	-	-	-	2	-
			AVg	**2.8**	**1.3**	**1.6**	**1**	**-**	**1.5**	**1.8**	**-**		**-**	**-**	**1.5**	**-**
	21155C62	Design of Steel Structural Elements	Understand the concepts of various design philosophies	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design common bolted and welded connections for steel structures	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design tension members and understand the effect of shear lag.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the design concept of axially loaded columns and column base connections.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand specific problems related to the design of laterally restrained and unrestrained steel beams.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155C63	Structural Analysis II	Draw influence lines for statically determinate structures and calculate critical stress resultants.	3	3	2	1	1	1	-	-	-	-	-	-	-
			Understand Muller Breslau principle and draw the influence lines for statically indeterminate beams.	3	3	2	1	2	1	-	-	-	-	-	-	-
			Analyse of three hinged, two hinged and fixed arches.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Analyse the suspension bridges with stiffening girders	3	3	1	1	2	1	-	-	-	-	-	-	-
			Understand the concept of Plastic analysis and the method of analyzing beams and rigid frames	3	3	1	1	2	1	-	-	-	-	-	-	-

			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21155C64	Hydrology and Water Resource Engineering	Define the hydrological processes and their integrated behaviour in catchments	3	3	1	1	0	0	0	0	2	0	2	3	-
			Apply the knowledge of hydrological processes to address basin characteristics, runoff and hydrograph	3	3	1	1	0	0	0	0	2	0	2	3	-
			Explain the concept of hydrological extremes and its management strategies	3	3	1	1	0	0	0	0	2	0	2	3	-
			Describe the principles of storage reservoirs	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand and apply the concepts of groundwater management	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155E65A	Prestressed Concrete Structures	Design a prestressed concrete beam accounting for losses.	3	3	2	1	1	1	-	-	-	-	-	-	-
			Design for flexure and shear	3	3	2	1	2	1	-	-	-	-	-	-	-
			Design the anchorage zone for post-tensioned members and estimate the deflection in beams.	3	3	2	2	2	1	-	-	-	-	-	1	-
			• Design composite members and continuous beams.	3	3	1	1	2	1	-	-	-	-	-	-	-
			Design water tanks, pipes, poles and sleepers.	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21155E65B	Water Resources Systems Engineering	Define the economic aspects and analysis of water resources systems for comprehensive and integrated planning of a water resources project.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Apply the concept of linear programming for optimisation of water resources problems.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Explain the concept of dynamic programming and apply in water resource system.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Develop the simulation model based on deterministic and stochastic simulation for reservoir operating policy	3	3	1	1	0	0	0	0	2	0	2	3	-
			Apply advance optimisation techniques like goal programming, heuristic algorithm in the field of water resources planning and management.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155E65C	Remote Sensing Concepts	Understand the concepts and laws related to remote sensing	3	3	2	1	1	1	-	-	-	-	-	-	-

			Understand the interaction of electromagnetic radiation with atmosphere and earth material	3	3	2	1	2	1	-	-	-	-	-	-	-
			Acquire knowledge about satellite orbits and different types of satellites	3	3	2	2	2	1	-	-	-	-	-	1	-
			Understand the different types of remote sensors	3	3	1	1	2	1	-	-	-	-	-	-	-
			Gain knowledge about the concepts of interpretation of satellite imagery	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21155E66A	Pile Foundation	Apart from vertically loaded piles, the structures are exposed to the peculiar pile subjected to lateral and uplift load with reference to codal provision and case studies.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the design of pile and pile caps, considering the wind and seismic loads.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Explain the importance of caisson foundation and checking the stability of caissons based on codal provisions.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155E66B	Urban Planning and Development	Understand the basic issues and meaning of terminologies in urban planning	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the different types of theories of urban planning and city development.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the different types of plan, their strategies and their preparation process.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Comprehend the planning standards, evaluate the constraints and the financial mechanism	3	3	1	1	0	0	0	0	2	0	2	3	-
			Knowledge on various town and country planning acts and their functions.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155E66C	Construction Equipment and Machinery	Develop knowledge on planning of equipment and selection of equipment	3	3	2	1	1	1	-	-	-	-	-	-	-
			Explain the knowledge on fundamentals of earth work operations, earth moving operations and types of earth work equipment	3	3	2	1	2	1	-	-	-	-	-	-	-
			Develop the knowledge on special construction equipment	3	3	2	2	2	1	-	-	-	-	-	1	-
			Apply the knowledge on asphalt and concrete plants	3	3	1	1	2	1	-	-	-	-	-	-	-
			Apply the knowledge and select the proper materials handling equipment	3	3	1	1	2	1	-	-	-	-	-	-	-

			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21155E67A	Advanced Construction Techniques	Understand the modern construction techniques used in the sub structure construction.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Demonstrate knowledge and understanding of the principles and concepts relevant to super structure construction for buildings	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the concepts used in the construction of special structures	3	3	1	1	0	0	0	0	2	0	2	3	-
			Knowledge on Various strengthening and repair methods for different cases.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Identify the suitable demolition technique for demolishing a building.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155E67B	Traffic Engineering and Management	Apply the knowledge of science and engineering fundamentals in conducting traffic surveys, analyze the problems and relating it with standards	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the principles of traffic flow characteristics and their relationships	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand various traffic management measures in addressing the demand Pricing and ITS applications	3	3	1	1	0	0	0	0	2	0	2	3	-
			Designing various types of control and regulatory measures to meet an efficient traffic network.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand various type of facilities and plan for Non Motorised Transport	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21155E67C	Dynamics and Earthquake Resistant Structures	Develop the equations of motion for SDOF and MDOF system and to evaluate the natural frequencies and mode shapes	3	3	2	1	1	1	-	-	-	-	-	-	-
			Explain the elements of engineering seismology, characteristics of earthquake and seismic instrumentation.	3	3	2	1	2	1	-	-	-	-	-	-	-
			Explain the behavior of various types of structures under earthquake	3	3	2	2	2	1	-	-	-	-	-	1	-
			Determine the forces in a structure due to earthquake	3	3	1	1	2	1	-	-	-	-	-	-	-
			Design earthquake resistant building structures	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-

	21147MC61A	Well Being with Traditional Practices	Learn the importance of different components of health	3	3	1	1	0	0	0	0	2	0	2	3	-
			Gain confidence to lead a healthy life	3	3	1	1	0	0	0	0	2	0	2	3	-
			Learn new techniques to prevent lifestyle health disorders	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the importance of diet and workouts in maintaining health	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21147MC61B	History of Science and Technology in India	The students will learn about history of science and technology in india.	3	3	1	1	0	0	0	0	2	0	2	3	-
	21147MC61C	Political and Economic Thought for a Humane Society	The students will get an understanding of how societies are shaped by philosophy, political and economic system, how they relate to fulfilling human goals & desires with some case studies of how different attempts have been made in the past and how they have fared.	3	3	1	1	0	0	0	0	2	0	2	3	-
	21147MC61D	State, Nation Building And Politics in India	It is expected that this course will make students aware of the theoretical aspect of the state, its organs, its operationalization aspect, the background and philosophy behind the founding of the present political system, broad streams and challenges of national integration and nation-building in India.	3	3	1	1	0	0	0	0	2	0	2	3	-
	21147MC61E	Safety In Engineering Industries	Understand the basic concept of safety.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Obtain knowledge of Statutory Regulations and standards.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Know about the safety Activities of the Working Place.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Analyze on the impact of Occupational Exposures and their Remedies	3	3	1	1	2	1	-	-	-	-	-	-	-
			Obtain knowledge of Risk Assessment Techniques.	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21155L69	Building Drawing and Detailing Laboratory	Draft the plan, elevation and sectional view of the load bearing and framed buildings	3	3	2	1	1	1	-	-	-	-	-	-	-
			Draw the structural detailing of RCC elements	3	3	2	1	2	1	-	-	-	-	-	-	-
			Draw the structural detailing of RCC water tanks, footings and retaining walls	3	3	2	2	2	1	-	-	-	-	-	1	-
			Draw the structural detailing of steel structures	3	3	1	1	2	1	-	-	-	-	-	-	-
			Draft the structural detailing of Industrial structures	3	3	1	1	2	1	-	-	-	-	-	-	-

			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
SEM 7	21147S71	Human Values and Ethics	Identify the importance of democratic, secular and scientific values in harmonious functioning of social life	3	3	2	1	1	1	-	-	-	-	-	-	-
			Practice democratic and scientific values in both their personal and professional life.	3	3	2	1	2	1	-	-	-	-	-	-	-
			Find rational solutions to social problems.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Behave in an ethical manner in society	3	3	1	1	2	1	-	-	-	-	-	-	-
			Practice critical thinking and the pursuit of truth.	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21150OE 72A	Data Science Fundamentals (CSE)	Gain knowledge on data science process	3	3	2	1	1	1	-	-	-	-	-	-	-
			Perform data manipulation functions using Numpy and Pandas.	3	3	2	1	2	1	-	-	-	-	-	-	-
			Understand different types of machine learning approaches.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Perform data visualization using tools	3	3	1	1	2	1	-	-	-	-	-	-	-
			Handle large volumes of data in practical scenarios.	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21150OE 72B	Artificial Intelligence and Machine Learning Fundamentals	Understand the basic concepts of AR and VR	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the tools and technologies related to AR/VR	3	3	1	1	0	0	0	0	2	0	2	3	-
			Know the working principle of AR/VR related Sensor devices	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design of various models using modeling techniques	3	3	1	1	0	0	0	0	2	0	2	3	-
			Develop AR/VR applications in different domains	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21147OE 73A	English for Competitive Examinations	expand their vocabulary and gain practical techniques to read and comprehend a wide range of texts with the emphasis required	3	3	1	1	0	0	0	0	2	0	2	3	-
			identify errors with precision and write with clarity and coherence	3	3	1	1	0	0	0	0	2	0	2	3	-
			understand the importance of task fulfilment and the usage of task-appropriate vocabulary	3	3	1	1	0	0	0	0	2	0	2	3	-

			communicate effectively in group discussions, presentations and interviews	3	3	1	1	0	0	0	0	2	0	2	3	-
			write topic based essays with precision and accuracy	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21153OE 73A	Renewable Energy Technologies	Discuss the Indian and global energy scenario.	3	3	2	1	1	1	-	-	-	-	-	-	-
			Describe the various solar energy technologies and its applications.	3	3	2	1	2	1	-	-	-	-	-	-	-
			Explain the various wind energy technologies.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Explore the various bio-energy technologies.	3	3	1	1	2	1	-	-	-	-	-	-	-
			Discuss the ocean and geothermal technologies	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21153OE 73B	Electric and Hybrid Vehicle	Understand the operation and architecture of electric and hybrid vehicles	3	3	1	1	0	0	0	0	2	0	2	3	-
			Identify various energy source options like battery and fuel cell	3	3	1	1	0	0	0	0	2	0	2	3	-
			Select suitable electric motor for applications in hybrid and electric vehicles.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Explain the role of power electronics in hybrid and electric vehicles	3	3	1	1	0	0	0	0	2	0	2	3	-
			Analyze the energy and design requirement for hybrid and electric vehicles.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21154OE 73A	Introduction to nonDestructive testing	Realize the importance of NDT in various engineering fields	3	3	2	1	1	1	-	-	-	-	-	-	-
			Have a basic knowledge of surface NDE techniques which enables to carry out various inspection in accordance with the established procedures.	3	3	2	1	2	1	-	-	-	-	-	-	-
			Calibrate the instrument and inspect for in-service damage in the components by means of Eddy current testing as well as Thermography testing.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Differentiate various techniques of UT and AET and select appropriate NDT methods for better evaluation.	3	3	1	1	2	1	-	-	-	-	-	-	-
			Interpret the results of Radiography testing and also have the ability to analyse the influence of various parameters on the testing.	3	3	1	1	2	1	-	-	-	-	-	-	-

			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21154OE 73B	Industrial Management	Understand the basic concepts of industrial management	3	3	1	1	0	0	0	0	2	0	2	3	-
			Identify the group conflicts and its causes.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Perform swot analysis	3	3	1	1	0	0	0	0	2	0	2	3	-
			Analyze the learning curves	3	3	1	1	0	0	0	0	2	0	2	3	-
			Understand the placement and performance appraisal	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21152OE 73A	Biomedical Instrumentation	Students will learn about various kinds of biomolecules and their physiological role.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Students will gain knowledge about various metabolic disorders and will help them to know the importance of various biomolecules in terms of disease correlation.	3	3	1	1	0	0	0	0	2	0	2	3	-
	21152OE 73B	Fundamentals of Electronic Devices and Circuits	Explain the structure and working operation of basic electronic devices.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design and analyze amplifiers.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Analyze frequency response of BJT and MOSFET amplifiers	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design and analyze feedback amplifiers and oscillator principles.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Design and analyze power amplifiers and supply circuits	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21154OE 74A	Additive Manufacturing	Recognize the development of AM technology and how AM technology propagated into various businesses and developing opportunities.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Acquire knowledge on process vat polymerization and material extrusion processes and its applications.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Elaborate the process and applications of powder bed fusion and binder jetting.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Evaluate the advantages, limitations, applications of material jetting and directed energy deposition processes.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Acquire knowledge on sheet lamination and direct write technology.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21154OE 74B	Industrial safety	Describe, with example, the common work-related diseases and accidents in occupational setting	3	3	1	1	0	0	0	0	2	0	2	3	-

			Name essential members of the Occupational Health team	3	3	1	1	0	0	0	0	2	0	2	3	-
			What roles can a community health practitioners play in an Occupational setting to ensure the protection, promotion and maintenance of the health of the employee	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21153OE 74A	Sensors	Understand various sensor effects, sensor characteristics, signal types, calibration methods and obtain transfer function and empirical relation of sensors. They can also analyze the densor response.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Analyze and select suitable sensor for displacement, proximity and range measurement.	3	3	2	1	2	1	-	-	-	-	-	-	-
			Analyze and select suitable sensor for force, magnetic field, speed, position and direction measurement.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Analyze and Select suitable sensor for light detection, pressure and temperature measurement and also familiar with other miniaturized smart sensors.	3	3	1	1	2	1	-	-	-	-	-	-	-
			Select and design suitable signal conditioning circuit with proper compensation and linearizing element based on sensor output signal.	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21153OE 74B	Electrical, Electronic and Magnetic materials	Understand various types of dielectric materials, their properties in various conditions.	3	3	2	1	1	1	-	-	-	-	-	-	-
			Evaluate magnetic materials and their behavior	3	3	2	1	2	1	-	-	-	-	-	-	-
			Evaluate semiconductor materials and technologies.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Select suitable materials for electrical engineering applications.	3	3	1	1	2	1	-	-	-	-	-	-	-
			Identify right material for optical and optoelectronic applications	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21152OE 77B	Medical Informatics	Explain the structure and functional capabilities of Hospital Information System.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Describe the need of computers in medical imaging and automated clinical laboratory.	3	3	1	1	0	0	0	0	2	0	2	3	-

			Articulate the functioning of information storage and retrieval in computerized patient record system.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Apply the suitable decision support system for automated clinical diagnosis.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Discuss the application of virtual reality and telehealth technology in medical industry.	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg													
	21155C75	Estimation , Costing & Valuation Engineering	Estimate the quantities for buildings,	3	3	2	1	1	1	-	-	-	-	-	-	-
			Rate Analysis for all Building works, canals, and Roads and Cost Estimate.	3	3	2	1	2	1	-	-	-	-	-	-	-
			Understand types of specifications, principles for report preparation, tender notices types.	3	3	2	2	2	1	-	-	-	-	-	1	-
			Gain knowledge on types of contracts	3	3	1	1	2	1	-	-	-	-	-	-	-
			Evaluate valuation for building and land.	3	3	1	1	2	1	-	-	-	-	-	-	-
			AVg	3	3	1.6	1.2	1.8	1	-	-	-	-	-	1	-
	21149S46	Environmental Sciences and Sustainability	carry out scoping and screening of developmental projects for environmental and social assessments	3	3	1	1	0	0	0	0	2	0	2	3	-
			explain different methodologies for environmental impact prediction and assessment	3	3	1	1	0	0	0	0	2	0	2	3	-
			plan environmental impact assessments and environmental management plans	3	3	1	1	0	0	0	0	2	0	2	3	-
			evaluate environmental impact assessment reports	3	3	1	1	0	0	0	0	2	0	2	3	-
			AVg	3	3	1	1	0	0	0	0	2	0	2	3	-
	21160S77	Total quality management	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.	3	3	1	1	0	0	0	0	2	0	2	3	-
			Development of critical thinking and synergistic research approach.	3	3	1	1	0	0	0	0	2	0	2	3	-
SEM 8	21155PW81	Project Work	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.	3	3	1	1	0	0	0	0	2	0	2	3	-