

**MOUNT ZION COLLEGE OF ENGINEERING AND TECHNOLOGY, KADAMMANITTA**

**DEPARTMENT OF APPLIED ELECTRONICS AND INSTRUMENTATION ENGINEERING**

SEMESTER	UNIVERSITY CODE	SUBJECT NAME	CO CODE	COURSE OUTCOME
<b>S1</b>	MAT101	LINEAR ALGEBRA AND CALCULUS	CO1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
			CO2	Develop and solve models of magnetic circuits
			CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
			CO4	Describe working of a voltage amplifier
			CO5	Outline the principle of an electronic instrumentation system
			CO6	Explain the principle of radio and cellular communication
	CYT100	ENGINEERING CHEMISTRY	CO1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
			CO2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
			CO3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.
			CO4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
			CO5	Study various types of water treatment methods to develop skills for treating wastewater.
	EST100	ENGINEERING MECHANICS	CO1	Recall principles and theorems related to rigid body mechanics
			CO2	Identify and describe the components of system of forces acting on the rigid body
			CO3	Apply the conditions of equilibrium to various practical problems involving different force system.
			CO4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
			CO5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
	EST120	BASICS OF CIVIL & MECHANICAL ENGINEERING	CO1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
			CO2	Explain different types of buildings, building components, building materials and building construction
			CO3	Describe the importance, objectives and principles of surveying.
			CO4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
			CO5	Discuss the Materials, energy systems, water management and environment for green buildings.
			CO6	Analyse thermodynamic cycles and calculate its efficiency
			CO7	Illustrate the working and features of IC Engines
			CO8	Explain the basic principles of Refrigeration and Air Conditioning
			CO9	Describe the working of hydraulic machines
			CO10	Explain the working of power transmission elements
	HUN101	LIFE SKILLS	CO1	Describe the basic manufacturing, metal joining and machining processes
			CO2	Define and Identify different life skills required in personal and professional life
			CO3	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
			CO4	Explain the basic mechanics of effective communication and demonstrate these through presentations.
			CO5	Take part in group discussions
			CO6	Use appropriate thinking and problem solving techniques to solve new problems
	CYL120	ENGINEERING CHEMISTRY LAB	CO1	Understand and practice different techniques of quantitative chemical analysis to generate
			CO2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the
			CO3	Develop the ability to understand and explain the use of modern spectroscopic techniques for
			CO4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
			CO5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
			CO6	Function as a member of a team, communicate effectively and engage in further learning. Also
	ESL120	CIVIL & MECHANICAL WORKSHOP	CO1	Name different devices and tools used for civil engineering measurements
			CO2	Explain the use of various tools and devices for various field measurements
			CO3	Demonstrate the steps involved in basic civil engineering activities like plot measurement,
			CO4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
			CO5	Compare different techniques and devices used in civil engineering measurements
			CO6	Identify Basic Mechanical workshop operations in accordance with the material and objects
			CO7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
			CO8	Apply appropriate safety measures with respect to the mechanical workshop trades
	MAT102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	CO1	Compute the derivatives and line integrals of vector functions and learn their applications
CO2			Evaluate surface and volume integrals and learn their inter-relations and applications.	
CO3			Solve homogeneous and non-homogeneous linear differential equation with constant coefficients	
CO4			Compute Laplace transform and apply them to solve ODEs arising in engineering	
CO5			Determine the Fourier transforms of functions and apply them to solve problems arising in engineering	
PHT100	ENGINEERING PHYSICS A	CO1	Compute the quantitative aspects of waves and oscillations in engineering systems.	
		CO2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.	
		CO3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.	
		CO4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems	
		CO5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system	
EST110	ENGINEERING GRAPHICS	CO1	Draw the projection of points and lines located in different quadrants	
		CO2	Prepare multiview orthographic projections of objects by visualizing them in different positions	
		CO3	Draw sectional views and develop surfaces of a given object	
		CO4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize	
		CO5	Convert 3D views to orthographic views	
		CO6	Obtain multiview projections and solid models of objects using CAD tools	
			CO1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits

<b>S2</b>	EST130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO2	Develop and solve models of magnetic circuits
			CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
			CO4	Describe working of a voltage amplifier
			CO5	Outline the principle of an electronic instrumentation system
			CO6	Explain the principle of radio and cellular communication
			CO1	Develop vocabulary and language skills relevant to engineering as a profession
			CO2	Analyze, interpret and effectively summarize a variety of textual content
			CO3	Create effective technical presentations
			CO4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
			CO5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
			CO6	Create professional and technical documents that are clear and adhering to all the necessary
			CO1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
			CO2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
			CO3	Write readable C programs with arrays, structure or union for storing the data to be processed
			CO4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
			CO5	Write readable C programs which use pointers for array processing and parameter passing
			CO6	Develop readable C programs with files for reading input and storing output
			CO1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
		CO2	Understand the need for precise measurement practices for data recording	
		CO3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations	
		CO4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber	
		CO5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results	
		CO1	Demonstrate safety measures against electric shocks.	
		CO2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	
		CO3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring	
		CO4	Identify and test various electronic components	
		CO5	Draw circuit schematics with EDA tools	
		CO6	Assemble and test electronic circuits on boards	
		CO7	Work in a team with good interpersonal skills	
<b>S3</b>	ECT201	SOLID STATE DEVICES	CO1	Apply Fermi-Dirac Distribution function and Compute carrier concentration at equilibrium and the parameters associated with generation, recombination and transport mechanism
			CO2	Explain drift and diffusion currents in extrinsic semiconductors and Compute current density due to these effects.
			CO3	Define the current components and derive the current equation in a pn junction diode and bipolar junction transistor.
			CO4	Explain the basic MOS physics and derive the expressions for drain current in linear and saturation regions.
			CO5	Discuss scaling of MOSFETs and short channel effects.
			CO1	Explain the elements of digital system abstractions such as digital representations of information, digital logic and Boolean algebra
			CO2	Create an implementation of a combinational logic function described by a truth table using and/or/inv gates/ muxes
			CO3	Compare different types of logic families with respect to performance and efficiency
			CO4	Design a sequential logic circuit using the basic building blocks like flip-flops
			CO5	Design and analyze combinational and sequential logic circuits through gate level Verilog models.
			CO6	Develop the representation of two-port networks using network parameters and analyse.
			CO1	Apply Mesh / Node analysis or Network Theorems to obtain steady state response of the linear time invariant networks.
			CO2	Apply Laplace Transforms to determine the transient behaviour of RLC networks.
			CO3	Apply Network functions and Network Parameters to analyse the single port and two port networks.
			CO1	Design and demonstrate the functioning of various combinational and sequential circuits using ICs
			CO2	Apply an industry compatible hardware description language to implement digital circuits
			CO3	Implement digital circuits on FPGA boards and connect external hardware to the boards
			CO4	Function effectively as an individual and in a team to accomplish the given task
		CO1	Define and classify continuous and discrete signals	
		CO2	Explain and characterize a system and LTI system	
		CO3	Explain the spectrum of a signal	
		CO1	Illustrate the working principles of electronic measuring instruments.	
		CO2	Identify various types of errors in measuring systems and choose methods for minimization of the	
		CO3	Summarize the concepts of DC and AC bridges used in measurement systems	
		CO4	Apply the principles and functions of various types of Transducers in measuring systems.	
		CO5	Explain the concepts of CRO, DSO, various recording devices .	
		CO1	Design analog signal processing circuits using diodes and first order RC circuit	
		CO2	Analyse basic amplifiers using BJT and MOSFET	
		CO3	Apply the principle of oscillator and regulated power supply circuits.	
		CO1	Apply properties of signals and systems to classify them	
		CO2	Represent signals with the help of series and transforms	
		CO3	Describe orthogonality of signals and convolution integral.	
		CO4	Apply transfer function to compute the LTI response to input signals.	
		CO5	Apply sampling theorem to discretize continuous time signals	
		CO1	Illustrate the working principles of electronic measuring instruments.	
		CO2	Identify various types of errors in measuring systems and choose methods for minimization of the	

**S4**

S4	AET206	MEASUREMENTS AND INSTRUMENTATION	CO3	Summarize the concepts of DC and AC bridges used in measurement systems
			CO4	Apply the principles and functions of various types of Transducers in measuring systems.
			CO5	Explain the concepts of CRO, DSO, various recording devices .
	ECL202	ANALOG CIRCUITS AND SIMULATION LAB	CO1	Design and demonstrate the functioning of basic analog circuits using discrete components.
			CO2	Design and simulate the functioning of basic analog circuits using simulation tools.
			CO3	Function effectively as an individual and in a team to accomplish the given task.
	AEL204	TRANSDUCERS AND MEASUREMENTS LAB	CO1	Make use of basic transducers for the measurement of physical variables like pressure ,temperature etc.
			CO2	Experiment with various measuring instruments and bridges
			CO3	Implement sensor based measurement systems using modern tools
			CO1	Implement sensor based measurement systems using modern tools
	AET282	INTRODUCTION TO DIGITAL SIGNAL PROCESSING	CO2	Apply Fourier transform in the analysis of signals
			CO3	Implement digital filters
			CO4	Explain the practical limitations in DSP implementations
			CO5	Explain the structure of a DSP processor.
	AET284	INTRODUCTION TO ANALOG CIRCUITS	CO1	Analyze simple circuits using diodes, resistors and capacitors
			CO2	Build amplifier and oscillator circuits
			CO3	Develop Power supplies, D/A and A/D convertors for various applications
			CO4	Develop and analyze circuits using operational amplifiers and explain concepts of PLL.
	AET286	INTRODUCTION TO INDUSTRIAL INSTRUMENTATION	CO1	Explain the working principles of electronic measuring instruments and different standards.
			CO2	Identify various principles employed in measuring systems and explain basic recording devices.
		CO3	Summarize the concepts of transducers used in industrial measurement systems.	
		CO4	Understand the principles of calibration of measurement systems.	
		CO5	Environmental concerns regarding industrial measurement systems and concepts of reliability.	
AET292	INSTRUMENTATION SYSTEM DESIGN	CO1	Identify different standards employed in the manufacture of devices and instruments.	
		CO2	Utilize the selection criteria employed in the selection of transducers and instruments in	
		CO3	Summarize the calibration employed for transducers and instruments..	
		CO4	Apply the principles governing installation of control panels and their operation.	
		CO5	Explain the concepts of various control schemes used in feedback systems and the principles of reliability, failure analysis and quality control	
AET294	SYSTEM DESIGN USING VERILOG	CO1	Describe Verilog hardware description, languages(HDL)	
		CO2	Explain Language Constructs and Conventions	
		CO3	Design digital circuits	
		CO4	Verify Behavioural models of digital circuits	
		CO5	Design Register Transfer Level (RTL) models of Digital Circuits.	
		CO6	Synthesize RTL models	
AET301	CONTROL SYSTEMS	CO1	Analyze the control systems by transfer function approach	
		CO2	Get an adequate knowledge in the time response of systems & steady state error analysis	
		CO3	Learn the concept of stability of control systems and methods of stability analysis.	
		CO4	Analyze the control systems using frequency domain method.	
		CO5	Apply the State Space Techniques to Control Systems.	
AET303	INDUSTRIAL INSTRUMENTATION AND AUTOMATION	CO1	Understand the working of different types of temperature sensors	
		CO2	Familiarize with the various types of pressure measurement techniques	
		CO3	Study the working of various flow measurement devices	
		CO4	Familiarize with the working of anemometers and viscometers	
		CO5	Understand the various level measurement techniques	
AET305	COMPUTER ARCHITECTURE AND EMBEDDED SYSTEMS	CO1	Explain the processor architecture and operation.	
		CO2	Explain the architecture of 8051 microcontroller.	
		CO3	Develop programs using assembly language 8051.	
		CO4	Develop Programming concepts of Embedded programming in C	
		CO5	Explain the concepts of RTOS based embedded system.	
AET307	ANALOG INTEGRATED CIRCUITS	CO1	Outline Op Amp fundamentals and differential amplifier configurations	
		CO2	Design operational amplifier circuits for various applications	
		CO3	Design Oscillators and active filters using opamps	
		CO4	Explain the working and applications of timer, VCO and PLL ICs	
		CO5	Outline the working of Voltage regulator IC's and Data converter	
AEL331	ANALOG INTEGRATED CIRCUITS AND INSTRUMENTATION LAB	CO1	Design the linear and non-linear applications of an opamp and special application ICs.	
		CO2	Explain and compare the working of multivibrators using special application IC 555	
		CO3	Illustrate the function of application specific ICs such as Voltage regulators, Data converters and PLL.	
		CO4	Explain the working of various transducers and their applications	
AEL333	EMBEDDED SYSTEMS LAB	CO1	Write an Assembly language program/Embedded C program for performing data manipulation.	
		CO2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals	
		CO3	Perform programming/interfacing experiments with IDE for modern microcontrollers.	
AET381	DIGITAL IMAGE PROCESSING	CO1	Explain the fundamental concepts related to digital image processing and generation of digital images.	
		CO2	Apply the principles of various 2D transforms in digital image processing.	
		CO3	Implement spatial and frequency domain image enhancement techniques using mathematical	
		CO4	Interpret the techniques involved in image segmentation and image restoration algorithms.	
		CO5	Compare different techniques involved in image compression and implement the fundamental image processing algorithms on computers	
AET383	POWER ELECTRONICS	CO1	Explain the characteristics of important power semiconductor switches	
		CO2	Explain the principle of drive circuits and snubber circuits for power semiconductor switches	
		CO3	Build diode bridge rectifiers and Controlled rectifiers	
		CO4	Explain the principle of DC – DC Switch-Mode Converter.	
		CO5	Illustrate the principle of DC – AC Switch-Mode Inverter	
		CO6	Apply the principle of power electronics for various applications.	
AET 385	CONTROL SYSTEMS	CO1	Analyze the control systems by transfer function approach.	
		CO2	Get an adequate knowledge in the time response of systems & steady state error analysis	
		CO3	Learn the concept of stability of control systems and methods of stability analysis.	

**S5**

S6

			CO4	Learn the concept of stability of control systems and methods of stability analysis.
			CO5	Design of basic control actions and controller characteristics.
	AET393	OPTIMIZATION TECHNIQUES	CO1	formulate and classify different optimisation problems
			CO2	Apply classical and numerical methods solving linear and non-linear optimisation problems
			CO3	Apply modern methods of optimisation for solving optimisation problems.
	AET395	ARM ARCHITECTURE DESIGN	CO4	Summarize the basic architecture of ARM processors
			CO5	Explain the ARM instruction set
			CO6	Compare the features of Thumb mode and ARM mode
			CO7	Summarize architectural support and memory
			CO8	Explain the architectural features of ARM Cortex
	AET302	DIGITAL SIGNAL PROCESSING	CO1	Outline the fundamental properties relevant to DFT and explain the use of computationally efficient algorithms for finding DFT and IDFT
			CO2	Develop filter response for linear phase FIR digital filters for given specifications
			CO3	Develop filter transfer function for IIR digital filters for given specifications using design concepts of analog filter and analog-to-digital transformations.
			CO4	Implement FIR and IIR filter structures for a given system function.
			CO5	Explain architectural features of general purpose DSP processors and finite word length effects in DSP systems and filters
	AET304	PROCESS DYNAMICS AND CONTROL	CO1	Explain the characteristics and elements of process dynamics
			CO2	Analyze a process control loop
			CO3	Model and tune a feedback controller
			CO4	Analyze multi-loop and multi variable controllers
	AET 306	POWER ELECTRONICS	CO1	Explain the characteristics of important power semiconductor switches
			CO2	Apply the principle of drive circuits and snubber circuits for power semiconductor switches
			CO3	Build diode bridge rectifiers and Controlled rectifiers
			CO4	Develop the principle of DC – DC Switch-Mode Converter.
			CO5	Illustrate the principle of DC – AC Switch-Mode Inverter
			CO6	Apply the principle of power electronics for various applications
	AET308	COMPEHENSIVE COURE WORK	CO1	Design and analyze combinational and sequential logic circuits
			CO2	Apply the knowledge of fundamental network theory in analyzing any given network.
			CO3	Analyze continuous and discrete time systems in time and frequency domain using various transformS
			CO4	Illustrate the basic principles involved in measurements and Instrumentation
			CO5	Describe fundamental concepts of control systems and mathematical modelling of the system.
	AET332	POWER ELECTRONICS LAB	CO1	Design and demonstrate the functioning of basic power electronics circuits.
			CO2	Design and simulate the functioning of basic power electronics circuits using simulation tools.
			CO3	Function effectively as an individual and in a team to accomplish the given task.
	ECT312	DIGITAL SYSTEM DESIGN	CO1	Analyze clocked synchronous sequential circuits
			CO2	Analyze asynchronous sequential circuits
			CO3	Design hazard free circuitS
			CO4	Diagnose faults in digital circuits
			CO5	Summarize the architecture of FPGA and CPLDs
	AET322	DIGITAL IMAGE PROCESSING	CO1	Explain digitisation of 2D signals and fundamentals of digital image processing.
			CO2	Analyze the various concepts and mathematical transforms necessary for image processing.
			CO3	Interpret the various image enhancement and restoration techniques.
			CO4	Illustrate image segmentation algorithm.
			CO5	Analyse basic image compression techniques.
	AET332	COMPUTER NETWORKS	CO1	Summarize the functions of each layer in the reference models.
			CO2	Explain the addressing at the data link layer, and various media access control methods
			CO3	Explain various services and addressing schemes at the network layer
			CO4	Review the transport layer services, TCP and UDP
			CO5	Summarize the application layer protocols and the concept of flow control for improving QOS.
	AET342	BIOMEDICAL INSTRUMENTATION	CO1	Describe the basic principles of physiological systems of human body
			CO2	Describe the basic principles of physiological systems of human body
			CO3	Explain the principle of patient monitoring systems and identify safety issues related to biomedical instrumentation.
			CO4	Describe the applications of medical imaging techniques in biomedical instrumentation.
	AET352	REALTIME OPERATING SYSTEMS	CO1	Summarize the basics of operating systems tasks and basic OS architectures
			CO2	Explain the concepts of different task scheduling schemes.
			CO3	Identify the problems and issues related with multitasking
			CO4	Interpret the strategies in interfacing the memory
			CO5	Illustrate various I/O Management and Disk Scheduling algorithms.
			CO6	Apply software development to embedded computer systems using RTOS.
	AET362	OPTOELECTRONIC DEVICES	CO1	Explain the physics of absorption, recombination and photoemission from semiconductors.
			CO2	Discuss different LED structures with material properties.
			CO3	Explain different types of lasers with distinct properties.
			CO4	Analyze different types of photo detectors based on their performance parameters
			CO5	Explain optical modulators and optical components.
	AET372	INTERNET OF THINGS	CO1	Explain in a cencise manner the architecture of IOT
			CO2	Identify various hardware components used in IOT
			CO3	Discuss the various connectivity technologies and interfaces in IOT
			CO4	Compare and appreciate the usage of modern technologies like cloud computing for data management in IOT
			CO5	Illustrate application of IOT with typical case studies in various fields and protocols

DEPARTMENT OF AERONAUTICAL ENGINEERING

SEMESTER	UNIVERSITY	SUBJECT NAME	CO CODE	COURSE OUTCOME
			CO1	solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			CO2	compute the partial and total derivatives and maxima and minima of multivariable functions

**S1**

S1	MAT 101	LINEAR ALGEBRA AND CALCULUS	CO3	compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
			CO4	perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
			CO5	determine the Taylor and Fourier series expansion of functions and learn their applications.
	PHT 110	ENGINEERING PHYSICS B	CO1	Compute the quantitative aspects of waves and oscillations in engineering systems.
			CO2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
			CO3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
			CO4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems
			CO5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system
	EST 100	ENGINEERING MECHANICS	CO1	Recall principles and theorems related to rigid body mechanics
			CO2	Identify and describe the components of system of forces acting on the rigid body
			CO3	Apply the conditions of equilibrium to various practical problems involving different force system.
			CO4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
CO5			Solve problems involving rigid bodies, applying the properties of distributed areas and masses	
EST 130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO1	Apply fundamental concepts and circuit laws to solve simple DC electric and magnetic circuits	
		CO2	Develop and solve models of magnetic circuits	
		CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady stat	
		CO4	Describe working of a voltage amplifier	
		CO5	Outline the principle of an electronic instrumentation system	
		CO6	Explain the principle of radio and cellular communication	
HUN 101	LIFE SKILLS	CO1	Define and Identify different life skills required in personal and professional life	
		CO2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.	
		CO3	Explain the basic mechanics of effective communication and demonstrate these through presentations.	
		CO4	Take part in group discussions	
		CO5	Use appropriate thinking and problem solving techniques to solve new problems	
		CO6	Understand the basics of teamwork and leadership	
PHL120	ENGINEERING PHYSICS LAB	CO1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories	
		CO2	Understand the need for precise measurement practices for data recording	
		CO3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations	
		CO4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics	
		CO5	Develop basic communication skills through working in groups in performing the laboratory	
ESL130	ELECTRICAL & ELECTRONICS WORKSHOP	CO1	Demonstrate safety measures against electric shocks	
		CO2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	
		CO3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings	
		CO4	Identify and test various electronic components	
		CO5	Draw circuit schematics with EDA tools	
		CO6	Assemble and test electronic circuits on boards	
		CO7	Work in a team with good interpersonal skills	
MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	CO1	Compute the derivatives and line integrals of vector functions and learn their applications	
		CO2	Evaluate surface and volume integrals and learn their inter-relations and applications.	
		CO3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients	
		CO4	Compute Laplace transform and apply them to solve ODEs arising in engineering	
		CO5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering	
CYT 100	ENGINEERING CHEMISTRY	CO1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.	
		CO2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.	
		CO3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials	
		CO4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.	
		CO5	Study various types of water treatment methods to develop skills for treating wastewater.	
EST 110	ENGINEERING GRAPHICS	CO1	Draw the projection of points and lines located in different quadrants	
		CO2	Prepare multiview orthographic projections of objects by visualizing them in different positions	
		CO3	Draw sectional views and develop surfaces of a given object	
		CO4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.	
		CO5	Convert 3D views to orthographic views and vice versa	
		CO6	Obtain multiview projections and solid models of objects using CAD tools	
EST 120	BASICS OF CIVIL & MECHANICAL ENGINEERING	CO1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.	
		CO2	Explain different types of buildings, building components, building materials and building	
		CO3	Describe the importance, objectives and principles of surveying.	
		CO4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps	
		CO5	Discuss the Materials, energy systems, water management and environment for green buildings	
		CO6	Analyse thermodynamic cycles and calculate its efficiency	

**S2**

			CO7	Illustrate the working and features of IC Engines
			CO8	Explain the basic principles of Refrigeration and Air Conditioning
			CO9	Describe the working of hydraulic machines
			CO10	Explain the working of power transmission elements
			CO11	Describe the basic manufacturing, metal joining and machining processes
	HUN 102	PROFESSIONAL COMMUNICATION	CO1	Develop vocabulary and language skills relevant to engineering as a profession
			CO2	Analyze, interpret and effectively summarize a variety of textual content
			CO3	Create effective technical presentations
			CO4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
			CO5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
			CO6	Create professional and technical documents that are clear and adhering to all the necessary
			CO1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
			CO2	Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
			CO3	Write readable C programs with arrays, structure or union for storing the data to be processed
			CO4	Divide a given computational problem into a number of modules and develop a readable multi-function
			CO5	Write readable C programs which use pointers for array processing and parameter passing
			CO6	Develop readable C programs with files for reading input and storing output
			CO1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
			CO2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
			CO3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
			CO4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
			CO5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
			CO6	Function as a member of a team, communicate effectively and engage in further learning. Also
			CO1	Name different devices and tools used for civil engineering measurements
			CO2	Explain the use of various tools and devices for various field measurements
			CO3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
			CO4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
			CO5	Compare different techniques and devices used in civil engineering measurements
			CO6	Identify Basic Mechanical workshop operations in accordance with the material and objects trades
				Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
			CO7	
			CO8	Apply appropriate safety measures with respect to the mechanical workshop trades

**S3**

			CO1	Define Properties of Fluids and Solve hydrostatic problems
			CO2	Explain fluid kinematics and Classify fluid flows
			CO3	Interpret Euler and Navier-Stokes equations and Solve problems using Bernoulli's equation
			CO4	Evaluate energy losses in pipes and sketch energy gradient lines
			CO5	Explain the concept of boundary layer and its applications
			CO6	Use dimensional Analysis for model studies
			CO 1	Explain structure of the atmosphere and basic concepts of airfoil
			CO 2	Explain aircraft structures and aircraft propulsion systems
			CO 3	Derive and discuss about the drag, power and thrust characteristics
			CO 4	Analyse the performance of aircraft under various flight conditions such as take-off, cruise, landing, climbing, gliding, turning and other manoeuvres
			CO 5	Evaluate static and dynamic response of aircraft for both voluntary and involuntary changes in flight conditions
			CO 1	Explain the fundamental concepts of deformable solids in the perspective of stress and strain.
			CO 2	Design various kinds of axial loaded members under different boundary conditions.
			CO 3	Calculate the loads in beams, forces and moments associated with different sections.
			CO 4	Illustrate the theory, principles associated to bending of beam and twisting of shaft and Apply the principles of bi-axial state of stresses in various problems through analytical and graphical methods.
			CO 5	Explain properties associated with aircraft materials
			CO 1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
			CO 2	Explain the different types of environmental pollution problems and their sustainable solutions
			CO 3	Discuss the environmental regulations and standards
			CO 4	Outline the concepts related to conventional and non-conventional energy
			CO 5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and
			CO 1	Understand the core values that shape the ethical behaviour of a professional.
			CO 2	Adopt a good character and follow an ethical life.
			CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal et
			CO 4	Solve moral and ethical problems through exploration and assessment by established experiments
			CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issue
			CO1	Understand the concept and the solution of partial differential equation.
			CO2	Analyse and solve one dimensional wave equation and heat equation.
			CO3	Understand complex functions, its continuity differentiability with the use of CauchyRiemann
			CO4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral
			CO5	Understand the series expansion of complex function about a singularity and Apply
			CO1	Calibrate flow measuring devices such as Venturimeter, orifice meter and notches
			CO 2	Determine hydraulic coefficients
			CO 3	Determine losses in pipes
			CO 4	Plot velocity profiles for any given fluid flow
			CO 5	Determine the stability of floating body

<b>S4</b>	AOL 201	FLUID MECHANICS LAB	CO 6	Determine the forces acting due to impact of jets on surfaces and drag force on a submerged body
			CO 1	Conduct tension test and compression test to characterize and evaluate the materials
			CO 2	Determine hardness of materials
	AOL 203	MATERIAL TESTING LAB	CO 3	Conduct Deflection test and bending test
			CO 4	Conduct flexural and torsion test to determine elastic constants
	AOT202	THERMODYNAMICS	CO 1	Evaluate the various thermodynamic relation and entropy changes
			CO 2	Analyse and solve the problems related to flow and non-flow process
			CO 3	Analyse the air standard cycle
			CO 4	Illustrate condition of working medium
			CO 5	Analyse the properties of pure substance
	AOT 204	AERODYNAMICS I	CO 1	Explain and use basic theorems in fluid mechanics
			CO 2	Sketch the stream line and equipotential lines of effective body under the different elementary flow combinations
			CO 3	Transform the flow past a body of definite shape in to flow past the other related bodies by using complex variables.
			CO 4	Apply airfoil theory to predict air foil performance characteristics.
			CO 5	Apply the concepts of propeller theory
	AOT 206	AIRCRAFT STRUCTURES I	CO 1	Design of prismatic components using suitable failure theory.
			CO 2	Solve deflection of beams under various loading conditions through analytical mean
			CO 3	Use energy principles to solve force and displacement of various members
			CO 4	Analyse statically indeterminate structures.
			CO 5	Analyse basic structural components and systems that are susceptible to instability.
MCN202	CONSTITUTION OF INDIA	CO 1	Explain the background of the present constitution of India and features	
		CO 2	Utilize the fundamental rights and duties.	
		CO 3	Understand the working of the union executive, parliament and judiciary.	
		CO 4	Understand the working of the state executive, legislature and judiciary.	
		CO 5	Utilize the special provisions and statutory institutions.	
		CO 6	Show national and patriotic spirit as responsible citizens of the country	
EST 200	DESIGN AND ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering.	
		CO 2	Apply design thinking while learning and practicing engineering	
		CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.	
MA202	COURSE NAME PROBABILITY, STATISTICS AND NUMERICAL METHODS	CO 1	Understand the concept, properties and important models of discrete random variables	
		CO 2	Understand the concept, properties and important models of continuous random	
		CO 3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population	
		CO 4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques	
		CO 5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.	
AOL202	AERODYNAMICS AND FLIGHT MECHA	CO 1	Determine the aerodynamic forces and moments experienced by airfoils, wings and bluff bodies	
		CO 2	Visualize the flow and pressure distribution over 2D and 3D bodies	
		CO 3	Evaluate various lateral and longitudinal stability derivatives and modes	
		CO 4	Demonstrate dynamic stability and its derivatives	
AOL 204	CAD LAB	CO1	Summarise 2D-3D modelling software	
		CO 2	Draw simple joints in modelling software.	
		CO 3	Create models of different control components using 3D modelling software	
		CO 4	Draw 3D models of critical aircraft components	
		CO 5	Sketch surface model of critical shape components	
AOT301	AIRCRAFT STRUCTURES II	CO1	Analyze bending stress in symmetrical & Unsymmetrical sections.	
		CO2	Analyze the shear flow in open section beams and Torsion of non-circular prismatic beams.	
		CO3	Analyze the shear flow in closed section beams.	
		CO4	Analyze the buckling behavior of plates, columns under various loads	
		CO5	Analyze the aircraft wing and fuselage.	
AOT303	AIRBREATHING PROPULSION	CO 1	Understand the basic of gas turbine engines and its components.	
		CO 2	Solve complex problems of centrifugal compressors.	
		CO 3	Construct velocity triangles and solve complex problems of axial flow compressor	
		CO 4	Apply the design concepts of turbines and able to solve complex problems by constructing velocity	
		CO 5	Understand the concepts of open ducted engines and able to solve complex problems	
AOT305	AERODYNAMICS II	CO 1	Apply basic theorems in compressible fluid dynamics	
		CO 2	Understand the concepts of shock waves and compressible flow through variable area passage and able to solve complex problems	
		CO 3	Understand the concepts of expansion waves and simple flows and able to solve complex problems.	
		CO 4	Apply the design concepts of high speed aerodynamics theories.	
		CO 5	Understand the concepts of boundary layer interaction with shockwave and hypersonic flows	
AOT307	AVIONICS AND AIRCRAFT SYSTEMS	CO 1	Understand the needs of integrated avionics and their subsystems in an aircraft.	
		CO 2	Understand the avionics system architecture and various databuses used in aircraft.	
		CO 3	Understand the principles of various cockpit displays and navigation system instruments.	
		CO 4	Understand the various control systems used in aircraft.	
		CO 5	Understand the conceptual design and working principles of various aircraft instruments.	
<b>S5</b>		CO1	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle (Cognitive knowledge level: Understand).	
		CO2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand)	

MCN 301	DISASTER MANAGEMENT	CO3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand).
		CO4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community (Cognitive knowledge level: Apply)
		CO5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand)
		CO6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand).
HUT 310	Management for Engineers	CO1	Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).
		CO2	Describe the functions of management (Cognitive Knowledge level: Understand)
		CO3	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand)
		CO4	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply)
		CO5	Summarize the functional areas of management (Cognitive Knowledge level: Understand).
		CO6	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).
AOL331	PROPULSION LAB	CO 1	Understand the velocity profile and nozzle flow problems.
		CO 2	Find out the performance using cascade tunnel.
		CO 3	Determine the heat transfer also studies heat exchanger working
		CO 4	Understand the performance of 2-stroke and 4-stroke engines
AOL333	AIRCRAFT STRUCTURAL ANALYSIS LA	CO 1	Determine the buckling and bending strength of different structural members.
		CO 2	Analyse the shear centre position for open and closed section of beams.
		CO 3	Determine the natural frequency for longitudinal and torsional vibration of different structural
		CO 4	Determine the stress-strain values for different structural components.
		CO 5	Understand the concepts of photoelasticity
AOT 302	HEAT TRANSFER	CO 1	Formulate and solve heat conduction problems with temperature dependent thermal properties, heat generation and across multi-layer materials.
		CO 2	Solve forced and free convection problems using boundary layer concepts and empirical solutions. Use of important non-dimensional parameters
		CO 3	Solve radiation problems using basic radiation laws like Planck's law, Wein's displacement law and Kirch
		CO 4	Solve design problems involving heat exchangers
		CO 5	Develop familiarity with special problems encountered in high speed flights and design of cooling systems and ablative heat shields
AOT304	VIBRATION AND AERO ELASTICITY	CO 1	Determine the natural frequency of free, damped and forced vibration for different conditions
		CO 2	Understand the vibrational concepts of several degrees of freedom systems
		CO 3	Apply the approximate methods to find the natural frequency
		CO 4	Understand the vibrational concepts of elastic bodies
		CO 5	Understand the aeroelastic instabilities and the methods of prevention
AOT306	NON-AIRBREATHING PROPULSION	CO 1	Understand the basic concepts of operating characteristics of rockets and able to solve basic problems
		CO 2	Understand the basic concepts and operating characteristics of solid propellant rocket motor and able to solve basic problems
		CO 3	Understand the basic concepts and operating characteristics of liquid propulsion system and able to solve basic problems
		CO 4	Understand the basic concepts and operating characteristics of hybrid rockets and different kind of nozzles applied to rocket propulsion and able to solve basic problems
		CO 5	Understand the basic concepts of other than chemical rockets.
AOT308	COMPREHENSIVE COURSE WORK	CO 1	Apply the theories and techniques used in aerodynamics
		CO 2	Analyse the design concepts and methods used in aircraft structures
		CO 3	Apply the concepts and working principles used in aircraft propulsion.
		CO 4	Analyse the stability and various maneuvering used in flight mechanics.
		CO 5	Apply the design and working principles of various avionics systems and instruments.
HUT 300	Industrial Economics & Foreign Trade	CO1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand)
		CO2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
		CO3	Determine the functional requirement of a firm under various competitive conditions (Cognitive knowledge level: Analyse)
		CO4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse)
		CO5	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)
AOT372	NON-DESTRUCTIVE TESTING	CO1	To introduce the basic principles, techniques, equipment, applications and limitations of NDT methods such as Visual, Penetrant Testing, Magnetic Particle Testing, Ultrasonic Testing, Radiography, Eddy Current
		CO2	To enable selection of appropriate NDT methods
		CO3	To identify advantages and limitations of nondestructive testing methods
		CO4	To make aware the developments and future trends in NDT
		CO5	Able to differentiate various defect types and select the appropriate NDT methods for the specimen
AOD334	MINI PROJECT	CO 1	To develop skills in doing literature survey.
		CO 2	To develop technical presentation and report preparation skills
		CO 3	To apply engineering knowledge in practical problem solving
		CO 4	To foster innovation in design of products, processes or systems
		CO 5	To develop creative thinking in finding viable solutions to engineering problems
		CO 1	Understand the basic concepts of carpentry works
		CO 2	Understand the principle and working procedure of different welding setup
		CO 3	Understand the manufacturing method of composite laminates
		CO 4	Understand the repairing procedure of aircraft fabric and rivets
		CO 5	Understand the bending and flaring procedure of aircraft tubes



AOL332	AIRFRAME PRODUCTION AND MAINTENANCE LAB	CO 6	Understand the forming procedure of aircraft sheet metals
		CO 7	Understand the splicing and swaging procedure of aircraft cables
		CO 8	Understand the basic concepts of lathe work.

**DEPARTMENT OF CIVIL ENGINEERING**

SEMESTER	UNIVERSITY	SUBJECT NAME	CO CODE	COURSE OUTCOME
<b>S1</b>	MAT 101	LINEAR ALGEBRA AND CALCULUS	CO1	solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			CO2	compute the partial and total derivatives and maxima and minima of multivariable functions
			CO3	compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
			CO4	perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
			CO5	determine the Taylor and Fourier series expansion of functions and learn their applications.
	PHT 110	ENGINEERING PHYSICS B	CO1	Compute the quantitative aspects of waves and oscillations in engineering systems.
			CO2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
			CO3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
			CO4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems
			CO5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system
	EST 100	ENGINEERING MECHANICS	CO1	Recall principles and theorems related to rigid body mechanics
			CO2	Identify and describe the components of system of forces acting on the rigid body
			CO3	Apply the conditions of equilibrium to various practical problems involving different force system.
			CO4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
			CO5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
	EST 130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO1	Apply fundamental concepts and circuit laws to solve simple DC electric and magnetic circuits
			CO2	Develop and solve models of magnetic circuits
			CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady stat
			CO4	Describe working of a voltage amplifier
			CO5	Outline the principle of an electronic instrumentation system
			CO6	Explain the principle of radio and cellular communication
	HUN 101	LIFE SKILLS	CO1	Define and Identify different life skills required in personal and professional life
			CO2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
			CO3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
			CO4	Take part in group discussions
			CO5	Use appropriate thinking and problem solving techniques to solve new problems
			CO6	Understand the basics of teamwork and leadership
	PHL120	ENGINEERING PHYSICS LAB	CO1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
			CO2	Understand the need for precise measurement practices for data recording
			CO3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
CO4			Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics	
CO5			Develop basic communication skills through working in groups in performing the laboratory	
ESL130	ELECTRICAL & ELECTRONICS WORKSHOP	CO1	Demonstrate safety measures against electric shocks	
		CO2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols	
		CO3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings	
		CO4	Identify and test various electronic components	
		CO5	Draw circuit schematics with EDA tools	
		CO6	Assemble and test electronic circuits on boards	
		CO7	Work in a team with good interpersonal skills	
MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	CO1	Compute the derivatives and line integrals of vector functions and learn their applications	
		CO2	Evaluate surface and volume integrals and learn their inter-relations and applications.	
		CO3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients	
		CO4	Compute Laplace transform and apply them to solve ODEs arising in engineering	
		CO5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering	
CYT 100	ENGINEERING CHEMISTRY	CO1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.	
		CO2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.	
		CO3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials	
		CO4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.	
		CO5	Study various types of water treatment methods to develop skills for treating wastewater.	
EST 110	ENGINEERING GRAPHICS	CO1	Draw the projection of points and lines located in different quadrants	
		CO2	Prepare multiview orthographic projections of objects by visualizing them in different positions	
		CO3	Draw sectional views and develop surfaces of a given object	
		CO4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.	
		CO5	Convert 3D views to orthographic views and vice versa	
		CO6	Obtain multiview projections and solid models of objects using CAD tools	

S2

EST 120	BASICS OF CIVIL & MECHANICAL ENGINEERING	CO1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
		CO2	Explain different types of buildings, building components, building materials and building
		CO3	Describe the importance, objectives and principles of surveying.
		CO4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
		CO5	Discuss the Materials, energy systems, water management and environment for green buildings
		CO6	Analyse thermodynamic cycles and calculate its efficiency
		CO7	Illustrate the working and features of IC Engines
		CO8	Explain the basic principles of Refrigeration and Air Conditioning
		CO9	Describe the working of hydraulic machines
		CO10	Explain the working of power transmission elements
		CO11	Describe the basic manufacturing, metal joining and machining processes
HUN 102	PROFESSIONAL COMMUNICATION	CO1	Develop vocabulary and language skills relevant to engineering as a profession
		CO2	Analyze, interpret and effectively summarize a variety of textual content
		CO3	Create effective technical presentations
		CO4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
		CO5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
		CO6	Create professional and technical documents that are clear and adhering to all the necessary
EST 102	PROGRAMMING IN C	CO1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
		CO2	Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
		CO3	Write readable C programs with arrays, structure or union for storing the the data to be processed
		CO4	Divide a given computational problem into a number of modules and develop a readable multi-function
		CO5	Write readable C programs which use pointers for array processing and parameter passing
		CO6	Develop readable C programs with files for reading input and storing output
CYL120	ENGINEERING CHEMISTRY LAB	CO1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
		CO2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
		CO3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
		CO4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
		CO5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
		CO6	Function as a member of a team, communicate effectively and engage in further learning. Also
ESL120	CIVIL & MECHANICAL WORKSHOP	CO1	Name different devices and tools used for civil engineering measurements
		CO2	Explain the use of various tools and devices for various field measurements
		CO3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
		CO4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
		CO5	Compare different techniques and devices used in civil engineering measurements
		CO6	Identify Basic Mechanical workshop operations in accordance with the material and objects trades
		CO7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
		CO8	Apply appropriate safety measures with respect to the mechanical workshop trades
MAT201	PARTIAL DIFFERENTIAL EQUATION AND COMPLEX ANALYSIS	CO1	Understand the concept and the solution of partial differential equation.
		CO2	Analyse and solve one dimensional wave equation and heat equation.
		CO3	Understand complex functions, its continuity differentiability with the use of CauchyRiemann
		CO4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function
		CO5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals.
CET202	MECHANICS OF SOLIDS	CO1	Recall the fundamental terms and theorems associated with mechanics of linear elastic deformable bodies.
		CO2	Explain the behavior and response of various structural elements under various loading conditions.
		CO3	Apply the principles of solid mechanics to calculate internal stresses/strains, stress resultants and strain
		CO4	Choose appropriate principles or formula to find the elastic constants of materials making use of the information available.
		CO5	Perform stress transformations, identify principal planes/ stresses and maximum shear stress at a point
		CO6	Analyse the given structural member to calculate the safe load or proportion the cross section to carry
CET 203	FLUID MECHANICS AND HYDRAULICS	CO1	Recall the relevant principles of hydrostatics and hydraulics of pipes and open channels .
		CO2	Identify or describe the type, characteristics or properties of fluid flow.
		CO3	Estimate the fluid pressure, perform the stability check of bodies under hydrostatic condition .
		CO4	Compute discharge through pipes or estimate the forces on pipe bends by applying hydraulic
		CO5	Analyze or compute the flow through open channels, perform the design of prismatic channels.
CET205	SURVEYING & GEOMATICS	CO1	Apply surveying techniques and principles of leveling for the preparation of contour maps, computation of area-volume and sketching mass diagram
		CO2	Apply the principles of surveying for triangulation
		CO3	Apply different methods of traverse surveying and traverse balancing
		CO4	Identify the possible errors in surveying and apply the corrections in field measurements
		CO5	Apply the basic knowledge of setting out of different types of curves
		CO6	Employ surveying techniques using advanced surveying equipments
EST200	DESIGN & ENGINEERING	CO1	Explain the different concepts and principles involved in design engineering.
		CO2	Apply design thinking while learning and practicing engineering.
		CO3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in e

S3

MCN201	SUSTAINABLE ENGINEERING	CO1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
		CO2	Explain the different types of environmental pollution problems and their sustainable solutions
		CO3	Discuss the environmental regulations and standards
		CO4	Outline the concepts related to conventional and non-conventional energy
		CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
CEL 201	ENGINEERING PLANNING & DRAFTING	CO1	Illustrate ability to organise civil engineering drawings systematically and professionally
		CO2	Prepare building drawings as per the specified guidelines.
		CO3	Assess a complete building drawing to include all necessary information
		CO4	Create a digital form of the building plan using any drafting software
CEL 203	SURVEY LAB	CO5	Use conventional surveying tools such as chain/tape and compass for plotting and area determination.
		CO6	Apply levelling principles in field
		CO7	Solve triangulation problems using theodolite
		CO8	Employ total station for field surveying
		CO9	Demonstrate the use of distomat and handheld GPS
CET281	BUILDING CONSTRUCTION AND STRUCTURAL SYSTEMS	CO1	Explain the properties and testing methods of different materials used for building construction.
		CO2	Explain the construction details of different components of buildings.
		CO3	Explain construction practices such as prefabricated, cost effective and sustainable technologies
		CO4	Explain the details and behavior of structural systems and structural elements used in buildings.
MAT202	PROBABILITY, STATISTICS AND ADVANCED GRAPH THEORY	CO1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena
		CO2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena
		CO3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population
		CO4	Understand the basic concept in Graph theory, Understand planar graphs and its properties.
		CO5	Understand the basic concept in Trees, coloring of graphs. Apply coloring of graphs, Apply algorithm to find the minimum spanning tree
CET202	ENGINEERING GEOLOGY	CO1	Recall the fundamental concepts of surface processes, subsurface process, minerals, rocks,
		CO2	Identify and describe the surface processes, subsurface process, earth materials, groundwater and
		CO3	Apply the basic concepts of surface and subsurface processes, minerals, rocks, groundwater and
		CO4	Analyze and classify geological processes, earth materials and groundwater.
		CO5	Evaluation of geological factors in civil engineering constructions.
CET 204	GEOTECHNICAL ENGINEERING - I	CO1	Explain the fundamental concepts of basic and engineering properties of soil
		CO2	Describe the laboratory testing methods for determining soil parameters
		CO3	Solve the basic properties of soil by applying functional relationships
		CO4	Calculate the engineering properties of soil by applying the laboratory test results and the fundamental concepts of soil mechanics
		CO5	Analyze the soil properties to identify and classify the soil
CET206	TRANSPORTATION ENGINEERING	CO1	Apply the basic principles of Highway planning and design highway geometric elements
		CO2	Apply standard code specifications in judging the quality of highway materials; designing mixes and pavements
		CO3	Explain phenomena in road traffic by collection, analysis and interpretation of traffic data through
		CO4	Understand about railway systems, tunnel, harbour and docks
		CO5	Express basics of airport engineering and design airport elements
HUT200	PROFESSIONAL ETHICS	CO1	Understand the core values that shape the ethical behaviour of a professional.
		CO2	Adopt a good character and follow an ethical life.
		CO3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
		CO4	Solve moral and ethical problems through exploration and assessment by established experiments.
		CO5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
MCN202	CONSTITUTION OF INDIA	CO1	Explain the background of the present constitution of India and features.
		CO2	Utilize the fundamental rights and duties.
		CO3	Understand the working of the union executive, parliament and judiciary.
		CO4	Understand the working of the state executive, legislature and judiciary.
		CO5	Utilize the special provisions and statutory institutions.
		CO6	Show national and patriotic spirit as responsible citizens of the country
CEL202	MATERIAL TESTING LAB- I	CO1	The understand the behaviour of engineering materials under various forms and stages of loading.
		CO2	Characterize the elastic properties of various materials.
		CO3	Evaluate the strength and stiffness properties of engineering materials under various loading
CEL 204	FLUID MECHANICS LAB	CO1	Apply fundamental knowledge of Fluid Mechanics to corresponding experiments
		CO2	Apply theoretical concepts in Fluid Mechanics to respective experiments
		CO3	Analyse experimental data and interpret the results
		CO4	Document the experimentation in prescribed manner
		CO1	The student will be able to understand building drawing, scales and methods of dimensioning
		CO2	The student will be able draw the details of panelled door, glazed windows, joint details of roof truss
		CO3	The student will be able to draw plan and sectional elevation of reinforced concrete staircase

	CET252	BUILDING DRAWING	CO4	Understand the basic concepts and methods of building drawing using AutoCAD Software
			CO5	The student will be able to prepare site plan, service plan, Septic tank and soak pit -detailed drawing
	CE 301	DESIGN OF CONCRETE STRUCTURES –	CO1	Acquisition of knowledge on various design philosophies and behavior of reinforced concrete structural elements subjected to flexure.
			CO2	Ability to understand the effect of shear and design shear reinforcements
			CO3	Acquisition of knowledge pertaining to behavior of reinforced concrete beam in flexure, shear, and torsion, and to design such beams by limit state method
			CO4	Ability to design one way slab and use code coefficients to design continuous slab.
			CO5	Ability to design two way slab and to assess various serviceability limit states using IS Code.
			CO6	Ability to design dog legged staircase and axially loaded short columns with lateral and helical reinforcement.
	CE 303	STRUCTURAL ANALYSIS II	CO1	Define static indeterminacy of an indeterminate structure and apply Clapeyrons Theorem (Three Moment Equation) to analyse the structure.
			CO2	Define kinematic indeterminacy of an indeterminate structure and apply slope deflection method to analyse continuous beams and portal frames.
			CO3	Define kinematic indeterminacy of an indeterminate structure and apply moment distribution method to analyse continuous beams and portal frames.
			CO4	Analyse continuous beams & frames using Kani's method.
			CO5	Analyse cantilever beam curved in plan and circular beam over simple supports.
			CO6	Identify the basic theorems of plastic analysis and apply this knowledge to calculate the fully plastic moment and collapse load for beams and portal frames.
	CE 305	GEOTECHNICAL ENGINEERING – II	CO1	Determine vertical stress due to various types of surface loads distributed over a particular area
			CO2	Calculate lateral earth pressures based on rankine's and coulomb's theories, analyse the effect of surcharge and water table on earth pressures
			CO3	Understand the concept of bearing capacity and settlement and estimate the safe bearing capacity for various types of soil, foundation and ground water conditions.
			CO4	Design combined footings and distinguish the working and applications of mat and well foundations.
			CO5	Determine the single pile capacity and group pile capacity for the design of piles in sand and clay
			CO6	Distinguish the vibration characteristics of machine foundation
	CE 307	GEOMATICS	CO1	Explain traverse surveying, errors in traversing and balancing the traverse.
			CO2	Discuss different type of curves used in civil engineering practice and setting out of a simple & compound curve.
			CO3	Explain global navigation satellite system and its working
			CO4	Explain GPS surveying
			CO5	Describe the fundamentals of remote sensing.
			CO6	Discuss the basics of Geographical Information System.
	CE 309	WATER RESOURCES ENGINEERING	CO1	Describe the hydrologic cycle and estimate the different components.
			CO2	Identify the basic concepts of hydrology and recognise the importance of estimation of runoff, analysis
			CO3	Determine crop water requirements for design of irrigation systems .
			CO4	Know the features of various river training works.
			CO5	Estimate the storage capacity of reservoirs and their useful life.
			CO6	Compute the yield of aquifers and wells.
	CE 361	ADVANCED CONCRETE TECHNOLOGY	CO1	Understand the different types of aggregates and cements, properties and tests for both aggregates and cement and the process of hydration.
			CO2	Know the process of manufacture of fresh concrete, its properties and tests and the effect of chemical admixtures
			CO3	Design the concrete mix using ACI and IS code methods and know the effects of mineral admixtures
			CO4	Know the procedure to determine the properties of hardened concrete.
			CO5	Gain ideas on Non-Destructive testing of concrete and understand the importance of Durability Concept of concrete
			CO6	Select and Design special concretes depending on their specific applications
	CE 363	GEOTECHNICAL INVESTIGATION	CO1	Understand the practical importance of soil exploration and to have a clear idea about planning and executing a geotechnical investigation programme.
			CO2	Understand various methods of soil exploration and to understand the principle of conducting plate load test.
			CO3	Explain the concept, procedure, limitations and engineering correlations of various sounding methods like- SPT, CPT & DCPT.
			CO4	Explain the procedure, uses and limitations of geophysical methods like- Seismic refraction method and electrical resistivity method.
			CO5	Understand soil sampling, factors affecting sample disturbance and various sampling techniques and samplers used for collecting sample from beneath water table.
			CO6	Describe the field tests like static and cyclic pile load test and to report the subsoil investigation data in the form of RQD, bore log and soil profile.
	CE 341	DESIGN PROJECT	CO1	Think innovatively on the development of components, products, processes or technologies in the engineering field
			CO2	Analyze the problem requirements and arrive at workable design solutions
			CO3	To understand and gain the knowledge of engineering practices behind developing a design for a product, so as to manage large projects in future.
	CE 331	MATERIAL TESTING LAB II	CO4	Describe and determine properties of cement.
			CO5	Describe the various test procedures for fresh concrete and able to judge the strength of concrete.
			CO6	Assess the various properties of aggregates..
			CO7	Describe and compute the strength of bricks, roofing and flooring tiles.
			CO1	To identify and perform the various soil identification and classification tests.
			CO2	To investigate, interpret and properly apply laboratory results obtained using standardized method for common civil engineering applications.

<b>S6</b>	CE 333	GEOTECHNICAL ENGINEERING LAB	CO3	To perform the different experiments for determination of index and engineering properties of soil and to develop confidence in students to assess the suitability of soil for various construction activities.
			CO4	To work as members of multidisciplinary project and/or research teams, and have an understanding of leadership in teams and organizations.
			CO5	To recognize the importance of good written communication skills, and know how to write professional, clear, concise technical reports to clients and colleagues.
	CE 302	DESIGN OF HYDRAULIC STRUCTURES	CO1	Identify the components and functions of diversion head works and apply Bligh's creep theory and
			CO2	Identifying the basic concepts behind the design of irrigation canals and design head regulator, cross
			CO3	Detailed design and drawings of different hydraulic structures.
			CO4	Identify the forces acting on the gravity dam, their modes of failure, design criteria, profile of gravity
			CO5	Ability to design arch dam and identifying different types of spillways
	CE 304	DESIGN OF CONCRETE STRUCTURES I	CO1	Design eccentrically loaded and slender columns using SP 16 design charts
			CO2	Design and detail rectangular and circular footings and understand the design principles of rectangular
			CO3	Design and detail cantilever retaining wall and understand the design principles of Counter fort
			CO4	Design and detail circular slabs and domes
			CO5	Design rectangular and circular water tanks using IS code coefficients (IS 3370)
			CO6	Gain knowledge of prestressed concrete fundamentals and analyse pre and post tensioned beams
	CE 306	COMPUTER PROGRAMMING AND COMPUTATIONAL TECHNIQUES	CO1	Describe the fundamentals of computer programming.
			CO2	Explain key terms used in C++ programming.
			CO3	Write programs in C++ using function and pointers.
			CO4	Explain the concept of class and objects in C++.
			CO5	Solve system of linear equations numerically.
			CO6	Able to construct programs for numerical solutions for engineering problems like system of equations
	CE 308	TRANSPORTATION ENGINEERING- I	CO1	Gain ideas about the principles and practice of Highway Engineering and Highway Alignment.
			CO2	Design various geometric elements of highways.
			CO3	Gain knowledge about pavement design concepts, material properties and to design highway
			CO4	Understand the various elements of pavement construction and traffic engineering.
			CO5	Apply principles of Traffic Engineering for efficient management of traffic components and gained
			CO6	Design basic airport facilities.
	HS300	PRINCIPLES OF MANAGEMENT	CO1	Manage people and organizations in global, innovative and entrepreneurial perspectives.
			CO2	Critically analyse and evaluate management theories and practices.
			CO3	Plan and make decision for organizations.
			CO4	Design organization structure and solve problems through proper decisions.
			CO5	Select appropriate staff for the organization and manage the related HRD functions.
			CO6	Apply proper leading and controlling techniques of management.
	CE 362	GROUND IMPROVEMENT TECHNIQUES	CO1	Identify the necessity of soil improvement and understand various ground improvement techniques.
			CO2	Develop an advanced knowledge of the performance of different grout materials and their applications
			CO3	Recognize suitable chemical stabilization method to improve the properties of problematic /difficult
		CO4	Acquire knowledge on ground anchors, rock bolts and soil nailing	
		CO5	Develop knowledge on soil compaction and select suitable compaction method to improve the	
		CO6	Identify hydraulic modification techniques and select suitable methods of dewatering method for	
CE 366	TRAFFIC ENGINEERING AND MANAGEMENT	CO1	Understand the importance of traffic management and explain the various methods used for	
		CO2	Understand and apply the knowledge of traffic regulations to the society	
		CO3	Apply the knowledge of capacity and level of service for the determination of theoretical capacity	
		CO4	Apply the knowledge of design of intersections and signals for the purpose construction of	
		CO5	Apply the knowledge of safety improvements measures for reducing road accidents	
		CO6	Apply the knowledge of theory of traffic flow for various flow analysis for applying smooth flow of	
CE 368	PRESTRESSED CONCRETE	CO1	Describe the concept of prestressing, systems of prestressing, analysis of prestress and loss of	
		CO2	Design sections for flexure with codal provisions and understand the limit state design criteria.	
		CO3	Design for shear and torsion of prestressed concrete members.	
		CO4	Analyze and find the deflection of a prestressed concrete beam.	
		CO5	Design end blocks and provide detailing of reinforcements	
		CO6	Analyse and Design composite beams, composite construction for tee beam bridges and statically	
CE 332	TRANSPORTATION ENGINEERING LAB	CO1	Determine the properties of various materials used in road construction.	
		CO2	Develop the understanding of various IRC specifications and BIS standards related to pavement	
		CO3	Prepare testing reports related to materials used for highway engineering works.	
		CO4	Exercise quality control in the construction of highways.	
		CO5	Work as members of multidisciplinary project or research teams.	
CE 334	COMPUTER AIDED CIVIL ENGINEERING LAB	CO1	Familiarize with different categories of building and its functional requirements.	
		CO2	Study National Building Code and Kerala Building Rules.	
		CO3	Study various menus and tools of CAD software.	
		CO4	Familiarize with digital drafting using software.	
		CO5	Study the applications of CAD in Civil engineering branch.	
		CO6	Draft plan, section, elevation, site plan and specification of residential and public buildings.	
		CO7	Familiarize the concepts of 3D drawing. Briefly get in touch with softwares like 3D Max and 3D Studio.	
		CO8	Individually submit a CAD project as per building rules and codes. Understand the practical knowhow of drafting.	
CE 352	COMPREHENSIVE EXAMINATION	CO1	The students will be confident in discussing the fundamental aspects of any engineering	

**DEPARTMENT OF COMPUTER SCIENCE ENGINEERING**

SEMESTER	UNIVERSITY	SUBJECT NAME	CO CODE	COURSE OUTCOME
	MAT101	LINEAR ALGEBRA AND CALCULUS	CO1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			CO2	Compute the partial and total derivatives and maxima and minima of multivariable functions
			CO3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and
			CO4	Perform various tests to determine whether a given series is convergent, absolutely convergent or
			CO5	Determine the Taylor and Fourier series expansion of functions and learn their applications.
			CO1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in
			CO2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.

**S1**

CYT100	ENGINEERING CHEMISTRY	CO3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound.		
		CO4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting		
		CO5	Study various types of water treatment methods to develop skills for treating wastewater.		
		EST100	ENGINEERING MECHANICS	CO1	Recall principles and theorems related to rigid body mechanics
				CO2	Identify and describe the components of system of forces acting on the rigid body
				CO3	Apply the conditions of equilibrium to various practical problems involving different force system.
				CO4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
				CO5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
		EST120	BASICS OF CIVIL AND MECHANICAL E	CO1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
				CO2	Explain different types of buildings, building components, building materials and building
				CO3	Describe the importance, objectives and principles of surveying.
CO4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps				
CO5	Discuss the Materials, energy systems, water management and environment for green buildings.				
CO6	Analyse thermodynamic cycles and calculate its efficiency				
CO7	Illustrate the working and features of IC Engines				
CO8	Explain the basic principles of Refrigeration and Air Conditioning				
CO9	Describe the working of hydraulic machines				
CO10	Explain the working of power transmission elements				
CO11	Describe the basic manufacturing, metal joining and machining processes				
HUN101	LIFE SKILLS	CO1	Define and Identify different life skills required in personal and professional life		
		CO2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.		
		CO3	Explain the basic mechanics of effective communication and demonstrate these through presentations.		
		CO4	Take part in group discussions		
		CO5	Use appropriate thinking and problem solving techniques to solve new problems		
		CO6	Understand the basics of teamwork and leadership		
CYL120	ENGINEERING CHEMISTRY LAB	CO1	Understand and practice different techniques of quantitative chemical analysis to generate		
		CO2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for		
		CO3	Develop the ability to understand and explain the use of modern spectroscopic techniques for		
		CO4	Acquire the ability to understand, explain and use instrumental techniques for chemical		
		CO5	Learn to design and carry out scientific experiments as well as accurately record and		
		CO6	Function as a member of a team, communicate effectively and engage in further learning. Also		
ESL120	CIVIL AND MECHANICAL WORKSHOP	CO1	Name different devices and tools used for civil engineering measurements		
		CO2	Explain the use of various tools and devices for various field measurements		
		CO3	Demonstrate the steps involved in basic civil engineering activities like plot		
		CO4	Choose materials and methods required for basic civil engineering activities like field		
		CO5	Compare different techniques and devices used in civil engineering measurements		
		CO6	Identify Basic Mechanical workshop operations in accordance with the material and objects		
		CO7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades		
		CO8	Apply appropriate safety measures with respect to the mechanical workshop trades		
MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	CO1	Compute the derivatives and line integrals of vector functions and learn their applications		
		CO2	Evaluate surface and volume integrals and learn their inter-relations and applications.		
		CO3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients		
		CO4	Compute Laplace transform and apply them to solve ODEs arising in engineering		
		CO5	Determine the Fourier transforms of functions and apply them to solve problems arising in		
PHT 100	ENGINEERING PHYSICS A	CO1	Compute the quantitative aspects of waves and oscillations in engineering systems.		
		CO2	Apply the interaction of light with matter through interference, diffraction and identify these		
		CO3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum		
		CO4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and		
		CO5	Analyze the principles behind various superconducting applications, explain the working of solid state		
EST 130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits		
		CO2	Develop and solve models of magnetic circuits		
		CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady		
		CO4	Describe working of a voltage amplifier		
		CO5	Outline the principle of an electronic instrumentation system		
		CO6	Explain the principle of radio and cellular communication		
EST 110	ENGINEERING GRAPHICS	CO1	Draw the projection of points and lines located in different quadrants		
		CO2	Prepare multiview orthographic projections of objects by visualizing them in different		
		CO3	Draw sectional views and develop surfaces of a given object		
		CO4	Prepare pictorial drawings using the principles of isometric and perspective projections to		
		CO5	Convert 3D views to orthographic views		
		CO6	Obtain multiview projections and solid models of objects using CAD tools		
EST 102	PROGRAMING IN C	CO1	Analyze a computational problem and develop an algorithm/flowchart to find its solution		
		CO2	Develop readable* C programs with branching and looping statements, which uses		
		CO3	Write readable C programs with arrays, structure or union for storing the data to be		
		CO4	Divide a given computational problem into a number of modules and develop a readable		
		CO5	Write readable C programs which use pointers for array processing and parameter passing		
		CO6	Develop readable C programs with files for reading input and storing output		
HUN 102	PROFESSIONAL COMMUNICATION	CO1	Develop vocabulary and language skills relevant to engineering as a profession		
		CO2	Analyze, interpret and effectively summarize a variety of textual content		
		CO3	Create effective technical presentations		
		CO4	Discuss a given technical/non-technical topic in a group setting and arrive at		
		CO5	Identify drawbacks in listening patterns and apply listening techniques for specific needs		
		CO6	Create professional and technical documents that are clear and adhering to all the		
ESL 130	ELECTRICAL & ELECTRONICS WORKS	CO1	Demonstrate safety measures against electric shocks.		
		CO2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries		
		CO3	Develop the connection diagram, identify the suitable accessories and materials necessary		
		CO4	Identify and test various electronic components		
		CO5	Draw circuit schematics with EDA tools		

**S2**

<b>S3</b>	PHL 120	ENGINEERING PHYSICS LAB	CO6	Assemble and test electronic circuits on boards
			CO7	Work in a team with good interpersonal skills
			CO1	Develop analytical/experimental skills and impart prerequisite hands on experience for
			CO2	Understand the need for precise measurement practices for data recording
			CO3	Understand the principle, concept, working and applications of relevant technologies and
			CO4	Analyze the techniques and skills associated with modern scientific tools such as lasers and
	MAT 203	DISCRETE MATHEMATICAL STRUCTURE	CO1	Check the validity of predicates in Propositional and Quantified Propositional Logic
			CO2	Solve counting problems by applying the elementary counting techniques - Rule of
			CO3	Classify binary relations into various types and illustrate an application for each type
			CO4	Illustrate an application for Partially Ordered Sets and Complete Lattices, in
			CO5	Explain Generating Functions and solve First Order and Second Order Linear
			CO6	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups,
	CST 201	DATA STRUCTURES	CO1	Design an algorithm for a computational task and calculate the time/space
			CO2	Identify the suitable data structure (array or linked list) to represent a data item
			CO3	Write an algorithm to find the solution of a computational problem by selecting an
			CO4	Store a given dataset using an appropriate Hash Function to enable efficient access of data in the given
			CO5	Select appropriate sorting algorithms to be used in specific circumstances (Cognitive
			CO6	Design and implement Data Structures for solving real world problems efficiently
	CST 203	LOGIC SYSTEM DESIGN	CO1	Illustrate decimal, binary, octal, hexadecimal and BCD number systems, perform
			CO2	Simplify a given Boolean Function and design a combinational circuit to implement the simplified
			CO3	Design combinational circuits - Adders, Code Convertors, Decoders, Magnitude
			CO4	Design sequential circuits - Registers, Counters and Shift Registers. (Cognitive
			CO5	Use algorithms to perform addition and subtraction on binary, BCD and floating point
	CST 205	OBJECT ORIENTED PROGRAMMING USING JAVA	CO1	Write Java programs using the object oriented concepts - classes, objects,
			CO2	Utilise datatypes, operators, control statements, built in packages & interfaces, Input/
			CO3	Illustrate how robust programs can be written in Java using exception handling
CO4			Write application programs in Java using multithreading and database connectivity	
CO5			Write Graphical User Interface based application programs by utilising event	
MCN201	SUSTAINABLE ENGINEERING	CO1	Understand the relevance and the concept of sustainability and the global initiatives in this	
		CO2	Explain the different types of environmental pollution problems and their sustainable	
		CO3	Discuss the environmental regulations and standards	
		CO4	Outline the concepts related to conventional and non-conventional energy	
		CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering	
EST 200	DESIGN AND ENGINEERING	CO1	Explain the different concepts and principles involved in design engineering.	
		CO2	Apply design thinking while learning and practicing engineering.	
		CO3	Develop innovative, reliable, sustainable and economically viable designs	
CSL 201	DATA STRUCTURES LAB	CO1	Write a time/space efficient program using arrays/linked lists/trees/graphs to provide	
		CO2	Write a time/space efficient program to sort a list of records based on a given key in	
		CO3	Examine a given Data Structure to determine its space complexity and time	
		CO4	Design and implement an efficient data structure to represent given data (Cognitive	
		CO5	Write a time/space efficient program to convert an arithmetic expression from one	
		CO6	Write a program using linked lists to simulate Memory Allocation and Garbage	
CSL 203	OBJECT ORIENTED PROGRAMMING USING JAVA	CO1	Implement the Object Oriented concepts - constructors, inheritance, method	
		CO2	Implement programs in Java which use datatypes, operators, control statements,	
		CO3	Implement robust application programs in Java using exception handling	
		CO4	Implement application programs in Java using multithreading and database	
		CO5	Implement Graphical User Interface based application programs by utilizing event	
MAT 206	GRAPH THEORY	CO1	Explain vertices and their properties, types of paths, classification of graphs and	
		CO2	Demonstrate the fundamental theorems on Eulerian and Hamiltonian graphs.	
		CO3	Illustrate the working of Prim's and Kruskal's algorithms for finding minimum cost	
		CO4	Explain planar graphs, their properties and an application for planar graphs.	
		CO5	Illustrate how one can represent a graph in a computer. (Cognitive Knowledge	
		CO6	Explain the Vertex Color problem in graphs and illustrate an example application	
CST 202	COMPUTER ORGANIZATION AND ARCHITECTURE	CO1	Recognize and express the relevance of basic components, I/O organization and	
		CO2	Explain the types of memory systems and mapping functions used in memory systems	
		CO3	Demonstrate the control signals required for the execution of a given instruction	
		CO4	Illustrate the design of Arithmetic Logic Unit and explain the usage of registers in it	
		CO5	Explain the implementation aspects of arithmetic algorithms in a digital computer	
		CO6	Develop the control logic for a given arithmetic problem (Cognitive Knowledge	
CST 204	DATABASE MANAGEMENT SYSTEMS	CO1	Summarize and exemplify fundamental nature and characteristics of database systems	
		CO2	Model real word scenarios given as informal descriptions, using Entity Relationship	
		CO3	Model and design solutions for efficiently representing and querying data using	
		CO4	Demonstrate the features of indexing and hashing in database applications (Cognitive	
		CO5	Discuss and compare the aspects of Concurrency Control and Recovery in Database	
		CO6	Explain various types of NoSQL databases (Cognitive Knowledge Level:	
CST 206	OPERATING SYSTEMS	CO1	Explain the relevance, structure and functions of Operating Systems in computing	
		CO2	Illustrate the concepts of process management and process scheduling mechanisms	
		CO3	Explain process synchronization in Operating Systems and illustrate process	
		CO4	Explain any one method for detection, prevention, avoidance and recovery for	
		CO5	Explain the memory management algorithms in Operating Systems. (Cognitive	
		CO6	Explain the security aspects and algorithms for file and storage management in	
MCN202	CONSTITUTION OF INDIA	CO1	Explain the background of the present constitution of India and features.	
		CO2	Utilize the fundamental rights and duties.	
		CO3	Understand the working of the union executive, parliament and judiciary.	
		CO4	Understand the working of the state executive, legislature and judiciary.	
		CO5	Utilize the special provisions and statutory institutions.	
		CO6	Show national and patriotic spirit as responsible citizens of the country	

S5	HUT 200	PROFESSIONAL ETHICS	CO1	Understand the core values that shape the ethical behaviour of a professional.
			CO2	Adopt a good character and follow an ethical life.
			CO3	Explain the role and responsibility in technological development by keeping personal ethics
			CO4	Solve moral and ethical problems through exploration and assessment by established
			CO5	Apply the knowledge of human values and social values to contemporary ethical values and
	CSL 202	DIGITAL LAB	CO1	Design and implement combinational logic circuits using Logic Gates (Cognitive
			CO2	Design and implement sequential logic circuits using Integrated Circuits
			CO3	Simulate functioning of digital circuits using programs written in a Hardware
			CO4	Function effectively as an individual and in a team to accomplish a given task of
	CST 206	OPERATING SYSTEMS LAB	CO1	Illustrate the use of systems calls in Operating Systems. (Cognitive knowledge:
			CO2	Implement Process Creation and Inter Process Communication in Operating
			CO3	Implement First Come First Served, Shortest Job First, Round Robin and Prioritybased
			CO4	Illustrate the performance of First In First Out, Least Recently Used and Least
			CO5	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating
			CO6	Implement modules for Storage Management and Disk Scheduling in Operating
	CS301	THEORY OF COMPUTATION	CO1	Design Finite State Automata.
			CO2	Design Regular grammar, Regular expression and Myhill- Nerode relation representations for regular
			CO3	Understand Pumping Lemma and design context-free grammar representations for context-free
			CO4	Design push-down automata
			CO5	Design Context Sensitive Grammar, Linear Bounded Automata and Turing Machines for accepting
CO6			Understand the notions of decidability and undecidability of problems and Classify formal languages	
CS303	SYSTEM SOFTWARE	CO1	Distinguish different software into different categories..	
		CO2	Design, analyze and implement one pass, two pass or multi pass assembler	
		CO3	Design, analyze and implement loader and linker.	
		CO4	Design, analyze and implement macro processors.	
		CO5	Critique the features of modern editing /debugging tools.	
CS305	MICROPROCESSORS AND MICROCONT	CO6	Describe different modes of operations of a typical microprocessor and microcontroller.	
		CO1	Design and develop 8086 assembly language programs using software interrupts and	
		CO2	Interface microprocessors with various external devices.	
		CO3	Describe different modes and operations of 8255,8259 and 8279.	
		CO4	Analyze and compare the features of microprocessors and microcontrollers.	
CS307	DATA COMMUNICATION	CO5	Describe the operations and develop assembly language programs using 8051 microcontroller.	
		CO6	Identify and list the various issues present in the design of a data communication system	
		CO1	Compare and select transmission media based on transmission impairments and channel capacity	
		CO2	Select and use appropriate signal encoding techniques	
		CO3	Select and use appropriate multiplexing techniques for a given scenario	
CS309	GRAPH THEORY AND COMBINATORIC	CO4	Design suitable error detection and error correction algorithms to achieve error free data	
		CO5	Explain different spread spectrum and switching techniques	
		CO1	Demonstrate the knowledge of fundamental concepts in graph theory, including properties and	
		CO2	Use graphs for solving real life problems.	
		CO3	Demonstrate properties and characterization of trees	
		CO4	Distinguish between planar and non-planar graphs and solve problems	
CS361	SOFT COMPUTING	CO5	Demonstrate Matrix representation of graphs	
		CO6	Develop efficient algorithms for graph related problems in different domains of engineering and	
		CO1	Learn soft computing techniques and their applications	
		CO2	Analyze various neural network architectures	
		CO3	Define the fuzzy systems.	
		CO4	Analyse Fuzzy Inference systems	
CS341	DESIGN PROJECT	CO5	Understand the genetic algorithm concepts and their applications	
		CO6	Describe various hybrid systems	
		CO1	Think innovatively on the development of components, products, processes or technologies in the	
CS331	SYSTEM SOFTWARE LAB	CO2	Analyze the problem requirements and arrive at workable design solutions	
		CO3	To understand and gain the knowledge of engineering practices behind developing a design for a	
		CO1	Student is able to compare and analyze CPU Scheduling algorithms like FCFS, Round Robin, SJF and	
		CO2	Students will be able to implement basic memory management schemes	
		CO3	Students will be able to implement Synchronization techniques using semaphores	
		CO4	Students will be able to implement Banker's algorithm for Deadlock Avoidance	
CS333	APPLICATION SOFTWARE DEVELOPM	CO5	Students will be able to implement Page replacement schemes, File Allocation and Organization	
		CO6	Students will be able to implement system software such as loaders, assemblers and macro processor.	
		CO1	Illustrate the DDL and DML Commands in SQL.	
		CO2	Evaluate the basic concepts in PL/SQL	
		CO3	Apply stored programming concepts using cursors and triggers	
CS302	DESIGN AND ANALYSIS OF ALGORITHM	CO4	Use GUI, Event Handling and Database connectivity to develop and deploy	
		CO5	Develop medium sized project in a team	
		CO1	Analyze the given algorithm and express the space and time complexities in asymptotic notations.	
		CO2	Solve the recurrence equations using Iteration Method, Recurrence Tree Method and Master Theorem	
		CO3	Solve the problems related to various Trees and Graphs	
		CO4	Design algorithms using divide and conquer methods and Dynamic Programming	
CS304	COMPILER DESIGN	CO5	Solve Optimization problems using Greedy strategy.	
		CO6	Design efficient algorithms using Back Tracking and Branch Bound Techniques, also classify	
		CO1	Explain the concepts and different phases of compilation with compile time error handling.	
		CO2	Represent language tokens using regular expressions, context free grammar and finite automata and	
		CO3	Develop parsers using top-down as well as bottom-up paradigms	
		CO4	Design syntax directed translation schemes for a given context free grammar.	
		CO5	Generate intermediate code for statements in high level language.	
		CO6	Apply optimization techniques to intermediate code and generate machine code for high level	
		CO1	Visualise the different aspects of networks, protocols and network design models.	
		CO2	Examine functions of Data Link layer and its protocols	



<b>S6</b>	CS306	COMPUTER NETWORKS	CO3	Compare and select appropriate routing algorithms for a network.
			CO4	Examine the important aspects and functions of network layer
			CO5	Compare various protocols in network layer
			CO6	Examine the important aspects and functions of transport layer and application layer in
	CS308	SOFTWARE ENGINEERING AND PROJE	CO1	Identify suitable life cycle models to be used.
			CO2	Analyze a problem and identify and define the computing requirements to the problem.
			CO3	Translate a requirement specification to a design using an appropriate software engineering
			CO4	Formulate appropriate testing strategy for the given software system.
			CO5	Develop software projects based on current technology, by managing resources economically and
	HS300	PRINCIPLES OF MANAGEMENT	CO1	Manage people and organizations in global, innovative and entrepreneurial perspectives.
			CO2	Critically analyse and evaluate management theories and practices.
			CO3	Plan and make decision for organizations.
			CO4	Design organization structure and solve problems through proper decisions.
			CO5	Select appropriate staff for the organization and manage the related HRD functions.
			CO6	Apply proper leading and controlling techniques of management.
	CS362	COMPUTER VISION	CO1	Appreciate the detailed models of image formation.
			CO2	Analyse the techniques for image feature detection and matching.
			CO3	Apply various algorithms for pattern recognition.
		CO4	Examine various clustering algorithms.	
		CO5	Analyze structural pattern recognition and feature extraction techniques.	
CS364	MOBILE COMPUTING	CO1	Explain various Mobile Computing applications, services and architecture.	
		CO2	Understand various technology trends for next generation cellular wireless networks.	
		CO3	Describe protocol architecture of WLAN technology and various MAC layer management algorithms.	
		CO4	Understand the protocols and platform for mobile computing.	
		CO5	Explain the structure of Mobile network and transport layers.	
		CO6	Understand Security Issues in mobile computing.	
CS368	WEB TECHNOLOGIES	CO1	Understand different components in web technology and to know about CGI and CMS.	
		CO2	Develop interactive web pages using HTML/XHTML.	
		CO3	Present a professional document using Cascaded Style Sheets.	
		CO4	Construct websites for user interactions using JavaScript and JQuery	
		CO5	Know the different information interchange formats like XML and JSON.	
		CO6	Develop web applications using PHP	
CS332	MICROPROCESSOR LAB	CO1	Develop assembly language programs for problem solving using software interrupts and various	
		CO2	Implement interfacing of various I/O devices to the microprocessor/microcontroller through assembly	
CS334	NETWORK PROGRAMMING LAB	CO1	Use network related commands and configuration files in Linux Operating System	
		CO2	Use of system calls in network application programs	
		CO3	Practice client-server networking applications using TCP and UDP	
		CO4	Analyze network traffic using network monitoring tools	
		CO5	Simulate wired and wireless scenarios using NS2	
CS352	COMPREHENSIVE EXAM	CO1	The students will be confident in discussing the fundamental aspects of any engineering	

**DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING**

SEMESTER	UNIVERSITY	SUBJECT NAME	CO CODE	COURSE OUTCOME
<b>S1</b>	MAT 101	LINEAR ALGEBRA AND CALCULUS	CO1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			CO2	Compute the partial and total derivatives and maxima and minima of multivariable functions
			CO3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and
			CO4	Perform various tests to determine whether a given series is convergent, absolutely convergent or
			CO5	Determine the Taylor and Fourier series expansion of functions and learn their applications.
	CYT 100	ENGINEERING CHEMISTRY	CO1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in
			CO2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
			CO3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound.
			CO4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting
			CO5	Study various types of water treatment methods to develop skills for treating wastewater.
	EST 110	ENGINEERING GRAPHICS	CO1	Draw the projection of points and lines located in different quadrants
			CO2	Prepare multiview orthographic projections of objects by visualizing them in different positions
			CO3	Draw sectional views and develop surfaces of a given object
			CO4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize
			CO5	Convert 3D views to orthographic views and vice versa
			CO6	Obtain multiview projections and solid models of objects using CAD tools
	HUN 101	LIFE SKILLS	CO1	Define and Identify different life skills required in personal and professional life
			CO2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
CO3			Explain the basic mechanics of effective communication and demonstrate these through presentations.	
CO4			Take part in group discussions	
CO5			Use appropriate thinking and problem solving techniques to solve new problems	
CO6			Understand the basics of teamwork and leadership	
CYL120	ENGINEERING CHEMISTRY LAB	CO1	Understand and practice different techniques of quantitative chemical analysis to generate	
		CO2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for	
		CO3	Develop the ability to understand and explain the use of modern spectroscopic techniques for	
		CO4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis	
		CO5	Learn to design and carry out scientific experiments as well as accurately record and analyze the	
		CO6	Function as a member of a team, communicate effectively and engage in further learning. Also	
EST 120	CS OF CIVIL & MECHANICAL ENGINEE	CO1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.	
		CO2	Explain different types of buildings, building components, building materials and building	
		CO3	Describe the importance, objectives and principles of surveying.	
		CO4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps	
		CO5	Discuss the Materials, energy systems, water management and environment for green	
		CO6	Analyse thermodynamic cycles and calculate its efficiency	
		CO7	Illustrate the working and features of IC Engines	
		CO8	Explain the basic principles of Refrigeration and Air Conditioning	

			CO9	Describe the working of hydraulic machines		
			CO10	Explain the working of power transmission elements		
			CO11	Describe the basic manufacturing, metal joining and machining processes		
			CO1	Name different devices and tools used for civil engineering measurements		
			CO2	Explain the use of various tools and devices for various field measurements		
			CO3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out		
			CO4	Choose materials and methods required for basic civil engineering activities like field measurements,		
			CO5	Compare different techniques and devices used in civil engineering measurements		
			CO6	Identify Basic Mechanical workshop operations in accordance with the material and objects trades		
			CO7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades		
S2	MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	CO8	Apply appropriate safety measures with respect to the mechanical workshop trades		
			CO1	Compute the derivatives and line integrals of vector functions and learn their applications		
			CO2	Evaluate surface and volume integrals and learn their inter-relations and applications.		
			CO3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients		
			CO4	Compute Laplace transform and apply them to solve ODEs arising in engineering		
			CO5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering		
			EST 100	ENGINEERING MECHANICS	CO1	Recall principles and theorems related to rigid body mechanics
					CO2	Identify and describe the components of system of forces acting on the rigid body
					CO3	Apply the conditions of equilibrium to various practical problems involving different force system.
					CO4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
CO5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses					
PHT 110	ENGINEERING PHYSICS B	CO1	Compute the quantitative aspects of waves and oscillations in engineering systems.			
		CO2	Apply the interaction of light with matter through interference, diffraction and identify these			
		CO3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum			
		CO4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and			
		CO5	Analyze the principles behind various superconducting applications, explain the working of solid state			
EST 130	BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO1	Apply fundamental concepts and circuit laws to solve simple DC electric and magnetic circuits			
		CO2	Develop and solve models of magnetic circuits			
		CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady stat			
		CO4	Describe working of a voltage amplifier			
		CO5	Outline the principle of an electronic instrumentation system			
		CO6	Explain the principle of radio and cellular communication			
HUN 102	PROFESSIONAL COMMUNICATION	CO1	Develop vocabulary and language skills relevant to engineering as a profession			
		CO2	Analyze, interpret and effectively summarize a variety of textual content			
		CO3	Create effective technical presentations			
		CO4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus			
		CO5	Identify drawbacks in listening patterns and apply listening techniques for specific needs			
		CO6	Create professional and technical documents that are clear and adhering to all the necessary			
EST 102	PROGRAMMING IN C	CO1	Analyze a computational problem and develop an algorithm/flowchart to find its solution			
		CO2	Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical,			
		CO3	Write readable C programs with arrays, structure or union for storing the data to be processed			
		CO4	Divide a given computational problem into a number of modules and develop a readable multi-			
		CO5	Write readable C programs which use pointers for array processing and parameter passing			
		CO6	Develop readable C programs with files for reading input and storing output			
PHL120	ENGINEERING PHYSICS LAB	CO1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering			
		CO2	Understand the need for precise measurement practices for data recording			
		CO3	Understand the principle, concept, working and applications of relevant technologies and comparison			
		CO4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber			
		CO5	Develop basic communication skills through working in groups in performing the laboratory			
ESL130	ELECTRICAL & ELECTRONICS WORKSHO	CO1	Demonstrate safety measures against electric shocks			
		CO2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries			
		CO3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring			
		CO4	Identify and test various electronic components			
		CO5	Draw circuit schematics with EDA tools			
		CO6	Assemble and test electronic circuits on boards			
		CO7	Work in a team with good interpersonal skills			
S3	MAT 201	PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS	CO1	Understand the concept and the solution of partial differential equation.		
			CO2	Analyse and solve one dimensional wave equation and heat equation.		
			CO3	Understand complex functions, its continuity differentiability with the use of Cauchy/Riemann		
			CO4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula,		
			CO5	Understand the series expansion of complex function about a singularity and Apply residue theorem to		
	ECT201	SOLID STATE DEVICES	CO1	Apply Fermi-Dirac Distribution function and Compute carrier concentration at equilibrium and the		
			CO2	Explain drift and diffusion currents in extrinsic semiconductors and Compute current density due to		
			CO3	Define the current components and derive the current equation in a pn junction diode and bipolar		
			CO4	Explain the basic MOS physics and derive the expressions for drain current in linear and		
			CO5	Discuss scaling of MOSFETs and short channel effects.		
ECT 203	LOGIC CIRCUIT DESIGN	CO1	Explain the elements of digital system abstractions such as digital representations of information,			
		CO2	Create an implementation of a combinational logic function described by a truth table using and/or/inv			
		CO3	Compare different types of logic families with respect to performance and efficiency			
		CO4	Design a sequential logic circuit using the basic building blocks like flip-flops			
		CO5	Design and analyze combinational and sequential logic circuits through gate level Verilog models.			
ECT205	NETWORK THEORY	CO1	Apply Mesh / Node analysis or Network Theorems to obtain steady state response of the linear time			
		CO2	Apply Laplace Transforms to determine the transient behaviour of RLC networks.			
		CO3	Apply Network functions and Network Parameters to analyse the single port and two port networks.			
		CO4	Understand the relevance and the concept of sustainability and the global initiatives in this direction			
MCN201	SUSTAINABLE ENGINEERING	CO5	Explain the different types of environmental pollution problems and their sustainable solutions			
		CO6	Discuss the environmental regulations and standards			
		CO7	Outline the concepts related to conventional and non-conventional energy			

<b>S4</b>	HUT 200	PROFESSIONAL ETHICS	CO8	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and	
			CO1	Understand the core values that shape the ethical behaviour of a professional.	
			CO2	Adopt a good character and follow an ethical life.	
			CO3	Explain the role and responsibility in technological development by keeping personal ethics and legal	
			CO4	Solve moral and ethical problems through exploration and assessment by established experiments.	
	ECL 201	SCIENTIFIC COMPUTING LABORATORY	CO5	Apply the knowledge of human values and social values to contemporary ethical values and global	
			CO1	Describe the needs and requirements of scientific computing and to familiarize one programming	
			CO2	Approximate an array/matrix with matrix decomposition.	
			CO3	Implement numerical integration and differentiation.	
			CO4	Solve ordinary differential equations for engineering applications	
			CO5	Compute with exported data from instruments	
			CO6	Realize how periodic functions are constituted by sinusoids	
	ECL 203	LOGIC DESIGN LAB	CO7	Simulate random processes and understand their statistics.	
			CO1	Design and demonstrate the functioning of various combinational and sequential circuits using ICs	
			CO2	Apply an industry compatible hardware description language to implement digital circuits	
			CO3	Implement digital circuits on FPGA boards and connect external hardware to the boards	
	MAT204	PROBABILITY, RANDOM PROCESSES AND NUMERICAL METHODS	CO4	Function effectively as an individual and in a team to accomplish the given task	
			CO1	Understand the concept, properties and important models of discrete random variables and,using them,	
			CO2	Understand the concept, properties and important models of continuous random variables and,using	
			CO3	Perform statistical inferences concerning characteristics of a population based on attributes of samples	
CO4			Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical		
CO5			Apply standard numerical techniques for solving systems of equations, fitting curves on given		
ECT202			ANALOG CIRCUITS	CO1	Design analog signal processing circuits using diodes and first order RC circui
				CO2	Analyse basic amplifiers using BJT and MOSFET
				CO3	Apply the principle of oscillator and regulated power supply circuits.
ECT 204			SIGNALS AND SYSTEMS	CO1	Apply properties of signals and systems to classify them
	CO2	Represent signals with the help of series and transforms			
	CO3	Describe orthogonality of signals and convolution integral.			
	CO4	Apply transfer function to compute the LTI response to input signals.			
	CO5	Apply sampling theorem to discretize continuous time signals			
ECT 206	COMPUTER ARCHITECTURE AND MICROCONTROLLERS	CO1	Explain the functional units, I/O and memory management w.r.t a typical computer architecture.		
		CO2	Distinguish between microprocessor and microcontroller.		
		CO3	Develop simple programs using assembly language programming.		
		CO4	Interface 8051 microcontroller with peripheral devices using ALP/Embedded C		
		CO5	Familiarize system software and Advanced RISC Machine Architecture		
EST 200	DESIGN AND ENGINEERING	CO1	Explain the different concepts and principles involved in design engineering.		
		CO2	Apply design thinking while learning and practicing engineering.		
		CO3	Develop innovative, reliable, sustainable and economically viable designs		
MCN202	CONSTITUTION OF INDIA	CO1	Explain the background of the present constitution of India and features.		
		CO2	Utilize the fundamental rights and duties.		
		CO3	Understand the working of the union executive, parliament and judiciary.		
		CO4	Understand the working of the state executive, legislature and judiciary.		
		CO5	Utilize the special provisions and statutory institutions.		
		CO6	Show national and patriotic spirit as responsible citizens of the country		
ECL 202	ANALOG CIRCUITS AND SIMULATION LAB	CO1	Design and demonstrate the functioning of basic analog circuits using discrete components.		
		CO2	Design and simulate the functioning of basic analog circuits using simulation tools.		
		CO3	Function effectively as an individual and in a team to accomplish the given task.		
ECL 204	MICROCONTROLLER LAB	CO1	Write an Assembly language program/Embedded C program for performing data manipulation.		
		CO2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals		
		CO3	Perform programming/interfacing experiments with IDE for modern microcontrollers.		
EC301	DIGITAL SIGNAL PROCESSING	CO1	Use DFT to evaluate time response and frequency response of signals and systems		
		CO2	Implement DFT via Radix -2 FFT		
		CO3	Design digital FIR filters using windowing and frequency sampling techniques.		
		CO4	Design of digital IIR filters from analog filters using IIT & BLT.		
		CO5	Implement digital filters in a computer with DSP architecture for signal processing using structures.		
		CO6	Describe the fundamental concepts of Multirate digital signal processing and illustrate finite word		
EC303	APPLIED ELECTROMAGNETIC THEORY	CO1	Develop a solid foundation and a fresh perspective in the analysis and application of electromagnetic		
		CO2	Analyze the propagation of electromagnetic waves in different media.		
		CO3	Analyze the reflection, refraction and polarization of plane electromagnetic waves and Poynting		
		CO4	Analyze the characteristics of transmission lines.		
		CO5	Solve the different transmission line and stub matching problems analytically and also using Smith		
		CO6	Analyze the different modes of propagation in waveguides.		
EC305	MICROPROCESSOR AND MICROCONTROLLER	CO1	Familiarise and compare microprocessors and microcontrollers and explain the architecture, pin		
		CO2	Familiarise instruction sets and development tools and apply them for writing simple assembly		
		CO3	Demonstrate the interfacing of peripheral devices with 8085 and 8051 and design 8051-based		
		CO4	Describe on chip peripherals of 8051 and develop programming skills in assembly for using them.		
		CO5	Familiarise 8086 and compare various Intel microprocessors.		
EC307	POWER ELECTRONICS & INSTRUMENTATION	CO1	Explain the concepts of power semiconductor devices as switches.		
		CO2	Discuss about different types of dc-dc converters.		
		CO3	Explain different types of Inverters with Pulse Width Modulation Technique and to explain the		
		CO4	Classify instruments, define performance parameters and to explain the working of different ac and dc		
		CO5	Describe about Resistive, Capacitive and Inductive transducers.		
		CO6	Discuss about various electronic measuring instruments.		
HS300	PRINCIPLES OF MANAGEMENT	CO1	Manage people and organizations in global, innovative and entrepreneurial perspectives.		
		CO2	Critically analyse and evaluate management theories and practices.		
		CO3	Plan and make decision for organizations.		
		CO4	Design organization structure and solve problems through proper decisions.		
		CO5	Select appropriate staff for the organization and manage the related HRD functions.		

**S5**

<b>S6</b>	EC365	BIOMEDICAL ENGINEERING	CO6	Apply proper leading and controlling techniques of management.
			CO1	Describe the anatomy and physiology of cardiac, nervous, muscular and respiratory systems
			CO2	Classify bio-electric potentials and bio potential electrodes.
			CO3	Explain the construction and working of clinical laboratory instrumentation, instruments and different
			CO4	Describe different therapeutic equipments.
			CO5	Explain and differentiate between different medical imaging techniques.
	EC341	DESIGN PROJECT	CO6	Define the importance of biotelemetry and patient safety system in medical field.
			CO1	Ability to analyse the design and technological aspects of existing products with reference to the
	EC333	DIGITAL SIGNAL PROCESSING LAB	CO2	Ability to think innovatively on the analysis of the problem requirements and arrive at workable design
			CO3	Generate and plot continuous and discrete time signals.
			CO4	Compute the time and frequency response of DT LTI system.
			CO5	Compute Linear and Circular convolution of Discrete time sequences.
			CO6	Find the DFT & IDFT and DCT & IDCT of sequences.
	EC335	POWER ELECTRONICS & INSTRUMENTATION LAB	CO7	Design and implement IIR & FIR Filters
			CO1	Use LCR meter for passive component measurement and to design PWM pulses for power
			CO2	Design and implement basic dc-dc converters.
			CO3	Design and implement basic dc-ac converters.
			CO4	Use temperature and light transducers for temperature and light intensity measurements.
	EC302	DIGITAL COMMUNICATION TECHNIQUES	CO5	Use LVDT and Strain Gauge trainer kits for displacement and strain measurements.
			CO1	Illustrate the digital representation of analog source and compare the performance of various Digital
			CO2	Examine the different problems caused by ISI while signal is transmitted through the communication
			CO3	Construct signal space representation of signal using Gram Schmidt orthonormalisation procedure .
			CO4	Compare the error probability for different digital modulation schemes like BPSK, BFSK, QPSK etc.
			CO5	Describe the principle of spread spectrum communication and to illustrate the concept of FHSS and
	EC304	VLSI	CO6	Understand various Diversity /multiple access Techniques.
			CO1	Discuss about IC fabrication process and fabrication sequence of different monolithic components.
			CO2	Explain the characteristics of CMOS inverter and to illustrate the stick diagram and layout of basic
			CO3	Analyze and implement logic circuits with MOSFET design styles
			CO4	Discuss different types of memory circuits, PLDs and FPGAs and to design PLAs
	EC306	ANTENNA & WAVE PROPAGATION	CO5	Analyse various adder and multiplier circuits.
			CO1	Explain basic concepts of radiating principles of antennas.
			CO2	Explain the basic antenna parameters.
CO3			Illustrate various techniques involved in various antenna parameter measurements.	
CO4			Explain various forms of antenna arrays and design broadside, endfire and Dolph Chebyshev arrays.	
CO5			Discuss different types of antennas.	
EC308	EMBEDDED SYSTEMS	CO6	Describe different modes of propagation of radio waves in the atmosphere.	
		CO1	Describe the components and design process of an embedded system	
		CO2	Illustrate the different communication bus standards and devices used in embedded networking.	
		CO3	Describe the role of memory, interrupts, I/O devices and device drivers in embedded systems.	
		CO4	Familiarize the concepts of embedded programming	
EC312	OBJECT ORIENTED PROGRAMMING	CO5	Describe various operating system concepts with respect to embedded systems	
		CO1	Illustrate the basic concepts of OOP in C++	
		CO2	Apply various object oriented features like inheritance and polymorphism to solve various computing	
		CO3	Interpret the advanced features of C++ such as abstract classes and virtual functions	
		CO4	Explain the features of Java such as class, overloading, inheritance, multithreading, packages and error	
		CO5	Describe android application development environment	
EC338	REAL TIME OPERATING SYSTEMS	CO6	Develop simple android applications	
		CO1	Familiar with the basics of operating systems tasks and basic OS architectures and develop these to	
		CO2	Choose various types of scheduling , scheduling algorithms in uniprocessor, multi-level feedback	
		CO3	Familiarize with the principle of concurrency in uniprocessor, mutual exclusion with hardware and	
		CO4	Handle memory management using various memory partitioning techniques, memory allocation	
EC370	DIGITAL IMAGE PROCESSING	CO5	Develop software for embedded computer systems using a real-time operating system.	
		CO1	Explain digitisation of 2D signals and fundamentals of digital image processing.	
		CO2	Analyse the various concepts and mathematical transforms necessary for image processing.	
		CO3	Interpret the various image enhancement and restoration techniques.	
		CO4	Illustrate image segmentation algorithm.	
EC332	COMMUNICATION ENGINEERING LAB	CO5	Analyse basic image compression techniques.	
		CO1	Design analog modulation and demodulation circuit.	
		CO2	Set up and tabulate the functioning of IF tuned amplifier.	
		CO3	Design and set up emphasis circuits and IC based frequency modulators.	
		CO4	Synthesize time division multiplexing circuit.	
EC334	MICROCONTROLLER LAB	CO5	Validate the functioning of different digital modulation techniques.	
		CO1	Identify the 8051 Trainer kit and hardware components.	
		CO2	Summarize 8051 assembly language instructions.	
		CO3	Knowledge in interfacing various peripheral modules using 8051 Trainer Kit.	
		CO4	Evaluate the interfacing of sensor modules using IDE.	
EC352	COMPREHENSIVE EXAM	CO5	Develop interfacing circuits for different application.	
		CO1	The students will be confident in discussing the fundamental aspects of any engineering	

**DEPARTMENT OF MECHANICAL ENGINEERING**

SEMESTER	UNIVERSITY	SUBJECT NAME	CO CODE	COURSE OUTCOME
	MAT 101	LINEAR ALGEBRA AND CALCULUS	CO1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
			CO2	Compute the partial and total derivatives and maxima and minima of multivariable functions
			CO3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
			CO4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
			CO5	Determine the Taylor and Fourier series expansion of functions and learn their applications.

**S1**

PHT 110	ENGINEERING PHYSICS B	CO1	Compute the quantitative aspects of waves and oscillations in engineering systems.
		CO2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
		CO3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
		CO4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems
		CO5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system
EST 110	ENGINEERING GRAPHICS	CO1	Draw the projection of points and lines located in different quadrants
		CO2	Prepare multiview orthographic projections of objects by visualizing them in different positions
		CO3	Draw sectional views and develop surfaces of a given object
		CO4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
		CO5	Convert 3D views to orthographic views
		CO6	Obtain multiview projections and solid models of objects using CAD tools
HUT 101	LIFE SKILLS	CO1	Define and Identify different life skills required in personal and professional life
		CO2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
		CO3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
		CO4	Take part in group discussions
		CO5	Use appropriate thinking and problem solving techniques to solve new problems
		CO6	Understand the basics of teamwork and leadership
PHL 120	ENGINEERING PHYSICS LAB	CO1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
		CO2	Understand the need for precise measurement practices for data recording
		CO3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
		CO4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber
		CO5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results
ESL 130	ELECTRICAL & ELECTRONICS WORKSHOP	CO1	Demonstrate safety measures against electric shocks.
		CO2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
		CO3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
		CO4	Identify and test various electronic components
		CO5	Draw circuit schematics with EDA tools
		CO6	Assemble and test electronic circuits on boards
		CO7	Work in a team with good interpersonal skills
EST 130	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING	CO1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
		CO2	Develop and solve models of magnetic circuits
		CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
		CO4	Describe working of a voltage amplifier
		CO5	Outline the principle of an electronic instrumentation system
		CO6	Explain the principle of radio and cellular communication
MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	CO1	Compute the derivatives and line integrals of vector functions and learn their applications
		CO2	Evaluate surface and volume integrals and learn their inter-relations and applications.
		CO3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
		CO4	Compute Laplace transform and apply them to solve ODEs arising in engineering
		CO5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering
HUT 102	PROFESSIONAL COMMUNICATION	CO1	Develop vocabulary and language skills relevant to engineering as a profession
		CO2	Analyze, interpret and effectively summarize a variety of textual content
		CO3	Create effective technical presentations
		CO4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
		CO5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
		CO6	Create professional and technical documents that are clear and adhering to all the necessary
EST 102	PROGRAMMING IN C	CO1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
		CO2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
		CO3	Write readable C programs with arrays, structure or union for storing the data to be processed
		CO4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
		CO5	Write readable C programs which use pointers for array processing and parameter passing
		CO6	Develop readable C programs with files for reading input and storing output
CYT 100	ENGINEERING CHEMISTRY	CO1	Understand and practice different techniques of quantitative chemical analysis to generate
		CO2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
		CO3	Develop the ability to understand and explain the use of modern spectroscopic techniques for
		CO4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
		CO5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
		CO6	Function as a member of a team, communicate effectively and engage in further learning. Also
EST 100	ENGINEERING MECHANICS	CO1	Recall principles and theorems related to rigid body mechanics
		CO2	Identify and describe the components of system of forces acting on the rigid body
		CO3	Apply the conditions of equilibrium to various practical problems involving different force system.
		CO4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
		CO5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
		CO1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.

**S2**

S3

EST120	BASICS OF CIVIL AND MECHANICAL ENGINEERING	CO2	Explain different types of buildings, building components, building materials and building
		CO3	Describe the importance, objectives and principles of surveying.
		CO4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
		CO5	Discuss the Materials, energy systems, water management and environment for green buildings.
		CO6	Analyse thermodynamic cycles and calculate its efficiency
		CO7	Illustrate the working and features of IC Engines
		CO8	Explain the basic principles of Refrigeration and Air Conditioning
		CO9	Describe the working of hydraulic machines
		CO10	Explain the working of power transmission elements
		CO11	Describe the basic manufacturing, metal joining and machining processes
		CYL 120	ENGINEERING CHEMISTRY LAB
CO2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs		
CO3	Develop the ability to understand and explain the use of modern spectroscopic techniques for		
CO4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis		
CO5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments		
CO6	Function as a member of a team, communicate effectively and engage in further learning. Also		
ESL 120	CIVIL & MECHANICAL WORKSHOP	CO1	Name different devices and tools used for civil engineering measurements
		CO2	Explain the use of various tools and devices for various field measurements
		CO3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
		CO4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
		CO5	Compare different techniques and devices used in civil engineering measurements
		CO6	Identify Basic Mechanical workshop operations in accordance with the material and objects
		CO7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
		CO8	Apply appropriate safety measures with respect to the mechanical workshop trades
MAT201	PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS	CO1	Understand the concept and the solution of partial differential equation.
		CO2	Analyse and solve one dimensional wave equation and heat equation.
		CO3	Understand complex functions, its continuity differentiability with the use of CauchyRiemann equations.
		CO4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function
		CO5	Understand the series expansion of complex function about a singularity and Apply residue theorem to
MCN201	SUSTAINABLE ENGINEERING	CO1	Understand the relevance and the concept of sustainability and the global initiatives in this direction.
		CO2	Explain the different types of environmental pollution problems and their sustainable solutions
		CO3	Discuss the environmental regulations and standards
		CO4	Outline the concepts related to conventional and non-conventional energy
		CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
MET 203	MECHANICS OF FLUIDS	CO1	Define Properties of Fluids and Solve hydrostatic problems
		CO2	Explain fluid kinematics and Classify fluid flows
		CO3	Interpret Euler and Navier-Stokes equations and Solve problems using Bernoulli's equation
		CO4	Evaluate energy losses in pipes and sketch energy gradient lines
		CO5	Explain the concept of boundary layer and its applications
		CO6	Use dimensional Analysis for model studies
MET205	METALLURGY AND MATERIAL SCIENCE	CO1	Understand the basic chemical bonds, crystal structures (BCC, FCC, and HCP), and their relationship with the properties.
		CO2	Analyze the microstructure of metallic materials using phase diagrams and modify the microstructure
		CO3	How to quantify mechanical integrity and failure in materials.
		CO4	Apply the basic principles of ferrous and non-ferrous metallurgy for selecting materials for specific applications.
		CO5	Define and differentiate engineering materials on the basis of structure and properties for engineering
HUT 200	Professional Ethics	CO1	Understand the core values that shape the ethical behaviour of a professional.
		CO2	Adopt a good character and follow an ethical life.
		CO3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
		CO4	Solve moral and ethical problems through exploration and assessment by established experiments.
		CO5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
MET201	MECHANICS OF SOLIDS	CO6	Determine the stresses, strains and displacements of structures by tensorial and graphical (Mohr's circle) approaches
		CO7	Analyse the strength of materials using stress-strain relationships for structural and thermal loading
		CO8	Perform basic design of shafts subjected to torsional loading and analyse beams subjected to bending moments
		CO9	Determine the deformation of structures subjected to various loading conditions using strain energy
		CO10	Analyse column buckling and appreciate the theories of failures and its relevance in engineering
MEJ 201	COMPUTER AIDED	CO1	Apply the knowledge of engineering drawings and standards to prepare standard dimensioned drawings of machine parts and other engineering components.
		CO2	Prepare standard assembly drawings of machine components and valves using part drawings and bill of materials

**S4**

S4	MEL201	COMPUTER AIDED MACHINE DRAWING	CO3	Apply limits and tolerances to components and choose appropriate fits for given assemblies.
			CO4	Interpret the symbols of welded, machining and surface roughness on the component drawings.
			CO5	Prepare part and assembly drawings and Bill of Materials of machine components and valves using CAD software.
	MEL203	MATERIALS TESTING LAB	CO1	To understand the basic concepts of analysis of circular shafts subjected to torsion.
			CO2	To understand the behaviour of engineering component subjected to cyclic loading and failure
			CO3	Evaluate the strength of ductile and brittle materials subjected to compressive, Tensile shear and bending
			CO4	Evaluate the microstructural morphology of ductile or brittle materials and its fracture modes (ductile
			CO5	To specify suitable material for applications in the field of design and manufacturing.
	MAT 202	PROBABILITY,STATISTICS AND NUMERICAL METHODS	CO1	Understand the concept, properties and important models of discrete random variables and,using them, analyse suitable random phenomena
			CO2	Understand the concept, properties and important models of continuous random variables and,using them, analyse suitable random phenomena.
			CO3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population
			CO4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques
			CO5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.
	MET202	ENGINEERING THERMODYNAMICS	CO1	Understand basic concepts and laws of thermodynamics
			CO2	Conduct first law analysis of open and closed systems
		CO3	Determine entropy and availability changes associated with different processes	
		CO4	Understand the application and limitations of different equations of state	
		CO5	Determine change in properties of pure substances during phase change processes	
		CO6	Evaluate properties of ideal gas mixtures	
MET 204	MANUFACTURING PROCESS	CO1	Illustrate the basic principles of foundry practices and special casting processes, their advantages, limitations and applications.	
		CO2	Categorize welding processes according to welding principle and material.	
		CO3	Understand requirements to achieve sound welded joint while welding different similar and dissimilar engineering materials.	
		CO4	Student will estimate the working loads for pressing, forging, wire drawing etc. processes	
		CO5	Recommend appropriate part manufacturing processes when provided a set of functional requirements	
ME206	FLUID MACHINERY	CO1	Calculate forces and work done by a jet on fixed,moving and curved plates	
		CO2	Analyze the performance of different turbines and categorize them for suitable application	
		CO3	Describe various components of centrifugal pumps and study their characteristic performance	
		CO4	Explain the positive displacement pump and study their performance characteristics	
		CO5	Do the analysis of aircompressor and select the suitable one for a specific application	
EST 200	DESIGN AND ENGINEERING	CO1	Explain the different concepts and principles involved in design engineering.	
		CO2	Apply design thinking while learning and practicing engineering.	
		CO3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.	
MCN202	CONSTITUTION OF INDIA	CO1	Explain the background of the present constitution of India and features.	
		CO2	Utilize the fundamental rights and duties.	
		CO3	Understand the working of the union executive, parliament and judiciary.	
		CO4	Understand the working of the state executive, legislature and judiciary. Utilize the special provisions and statutory institutions	
		CO5	Show national and patriotic spirit as responsible citizens of the country	
ME 230	FLUID MECHANICS AND MACHINES LABORATORY	CO1	Calibrate discharge measuring equipments in closed conduits (venturimeter, orificemeter, water meter et	
		CO2	Evaluate Darcy's constant, Chezy's constant, Manning's number, Critical velocity and minor losses in pi	
		CO3	Calculate metacentric height and radius of gyration of floating bodies	
		CO4	Understand the basics classification and working of pumps and turbines	
		CO5	Able select the type of turbine and pumps for different application and performance	
MEL 204	MACHINE TOOLS LAB- I	CO1	The students can operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality.	
		CO2	Apply cutting mechanics to metal machining based on cutting force and power consumption.	
		CO3	Select appropriate machining processes and process parameters for different metals.	
		CO4	Fabricate and assemble various metal components by welding and students will be able to visually examine their work and that of others for discontinuities and defects.	
		CO5	Infer the changes in properties of steel on annealing, normalizing, hardening and tempering.	
ME367	NON-DESTRUCTIVE TESTING	CO1	The students will be able to explain visual inspection method	
		CO2	The students will be able to describe liquid Penetrant inspection method	
		CO3	The students will be able to discuss magnetic particle inspection method	
		CO4	The students will be capable for explaining ultrasonic testing method	
		CO5	The students will be able to describe radiography testing method	
		CO6	The students will be able to discuss eddy current testing method	
ME371	NUCLEAR ENGINEERING	CO1	Analyse various aspects of atomic structure and calculate relevant quantities such as neutron cross	
		CO2	Identify and explain the function of basic component of a nuclear reactor, basic diffusion and slowing down of neutrons, main components and fuel, coolant, moderator	
		CO3	Compare the various materials used in nuclear reactor and analyse the fuel seperation and reprocessing of fuel materials	
		CO4	Understand the heat removal technique and emergency cooling systems used in nuclear reactor	
		CO5	Understand the significance of safe disposal of nuclear waste	
ME301	MECHANICS OF MACHINERY	CO1	Knowledge in different types of mechanisms and their inversions, and to calculate the degrees of freedom	
		CO2	Knowledge to conduct displacement,velocity and acceleration analysis of planar mechanisms	
		CO3	To conduct synthesis of mechanism, and to construct a mechanism for specified output motion.	

**S5**

	ME 303	MACHINE TOOLS AND DIGITAL MANUFACTURING	CO4	Knowledge to design and develop a cam for a specified follower motion.
			CO5	Knowledge in gear terminologies and to calculate velocity of gears in a gear train.
			CO1	Analyze various aspects of machining process and calculate relevant quantities such as velocities, feeds and cutting parameters.
			CO2	Identify and explain the function of the basic components and various mechanisms of a lathe and drilling machine.
			CO3	Compare the various machining process like shaping, slotting and planing and analyse their capabilities with regard to shape formation and surface texture.
			CO4	Understand the use of milling machines and their fields of application.
			CO5	Understand the principle and applications of grinding and super finishing operations.
			CO6	Understand the basic ideas and the importance of digital manufacturing
	ME 303	COMPUTER PROGRAMMING AND COMPUTATIONAL TECHNIQUES	CO1	Describe the fundamentals of computer programming.
			CO2	Explain key terms used in C++ programming.
			CO3	Write programs in C++ using function and pointers.
			CO4	Explain the concept of class and objects in C++.
			CO5	Solve system of linear equations numerically.
			CO6	Able to construct programs for numerical solutions for engineering problems like system of equations and Laplace equations.
		ELECTRICAL DRIVES & CONTROL FOR AUTOMATION	CO1	Students will develop a thorough knowledge theory of rotating dc machines and will be able to understand the performance and practical applications of dc motors.
			CO2	Students will be able to understand the performance and practical applications of dc motors.
			CO3	Students will be able to develop a thorough knowledge of single phase transformers and its applications.
			CO4	Students will be able to understand the importance and constructional details of Induction motor
			CO5	Students will be able to understand the constructional details and types of single phase induction motors and their applications.
			CO6	Students will be able to analyse the constructional details of stepper motor and controllers for automation
		PRINCIPLES OF MANAGEMENT	CO1	Manage people and organizations in global, innovative and entrepreneurial perspectives.
			CO2	Critically analyse and evaluate management theories and practices.
			CO3	Plan and make decision for organizations.
			CO4	Design organization structure and solve problems through proper decisions.
			CO5	Select appropriate staff for the organization and manage the related HRD functions.
			CO6	Apply proper leading and controlling techniques of management.
		DESIGN PROJECT	CO1	The students will be able to think innovatively on the development of components, products, processes and systems.
			CO2	The students will be able to analyse the problem requirements and arrive workable design solutions
CO3			The students will be able to understand the engineering aspects of design with reference to simple products and systems.	
CO4			The students will be able to develop design that add value to products and solve technical problems	
	MANUFACTURING TECHNOLOGY LAB I	CO1	To provide programming practice on CNC machine tools	
		CO2	To impart knowledge on the fundamental concepts and principles of metrology	
		CO3	To explain the need of various modern measuring instruments and precision measurements	

**S6**

	ME306	ADVANCED MANUFACTURING TECHNOLOGY	CO1	The students will be able to understand powder metallurgy and operation of PLC
			CO2	The students will be able to demonstrate tool path simulations with CNC powered equipment
			CO3	The students will be able to understand Electric Discharge Machining (EDM), Ultrasonic Machining (USM) and Electro chemical machining (ECM)
			CO4	The students will be able to understand Laser Beam Machining (LBM), Electron Beam Machining (EBM)
			CO5	The students will be able to understand about methods for High velocity forming of metals
			CO6	The students will be able to have basic idea about Micromachining, Advanced finishing processes and Material addition process.
	ME 308	COMPUTER AIDED DESIGN & ANALYSIS	CO1	Develop a sound knowledge about the devices and standards used in CAD/CAM systems.
			CO2	Understand the various transformations and types of Projections in CAD systems.
			CO3	Understand the basic geometric forms that are used to create and manipulate geometric models in a CAD system.
			CO4	Create an in depth knowledge about various solid modeling techniques.
			CO5	Apply the concepts of finite element method in complex problems.
			CO6	Solve structural analysis problems using finite element method.
	ME 366	ADVANCED METAL JOINING TECHNOLOGY	CO1	Describe the key process in Radiant energy welding process theories and applications
			CO2	Understand the theories and principles of Diffusion welding, Deformation welding and Cold pressure welding process
			CO3	Identify key variables and parameters in Explosive welding and Adhesive bonding
			CO4	Explain the process of Ultrasonic welding and Vacuum brazing
			CO5	Understand the concept of Plasma arc welding, Magnetically impelled arc butt welding and underwater welding
			CO6	Describe the concept of friction welding, friction stir welding and bonding mechanisms
ME302	HEAT AND MASS TRANSFER	CO1	Analyze problems involving steady state heat conduction in simple geometries	
		CO2	Evaluate heat transfer coefficients for natural and forced convection systems	
		CO3	Analyze the performance of fins and heat exchangers by applying the principles of conduction and convection	
		CO4	Assess the rate of radiation heat exchange between surfaces having simple configurations	
		CO5	Solve problems involving mass transfer due to diffusion and convection	
ME304	DYNAMICS OF MACHINERY	CO1	Students are capable of solving problems related to static and dynamic force analysis of planar mechanisms.	
		CO2	Students can explain turning moment diagrams of IC engines and can conduct flywheel analysis.	
		CO3	Students can explain the theory behind gyroscopic couple and to predict the effect of gyroscopic couple in aircraft, ships and automobiles.	
		CO4	Knowledge in the vibration model of a system, concept of free damped and un damped, forced vibration systems and can solve problem related to different damping conditions.	
		CO5	Students are capable of writing equation of motion of two degree, multi degree of freedom systems and choosing methods to solve frequency of such systems at different modes of vibration.	
		CO6	Students have knowledge in the critical speed of shafts and are capable of solving problems related to resonance.	
ME 312	METROLOGY AND INSTRUMENTATION	CO1	Understand the working of linear and angular measuring instruments	
		CO2	Know the fundamentals of limits and gauges	
		CO3	Know the various methods for measurement of screw thread and surface roughness parameters and the various methods for measurement of surface texture.	
		CO4	Get an exposure to advanced measuring devices and machine tool terminology	



			CO5	Acquire an overview of mechanical measurement systems and principle of instruments for motion and di
			CO6	Get basic idea about working principle and application of devices for measurement.
	ME332	COMPUTER AIDED DESIGN AND ANALYSIS LAB	CO1	Draw various 2D, 3D objects and surfaces
			CO2	Construct various solid model assemblies
			CO3	Analyse various mechanism designs and routings
			CO4	Analyse simple structural, heat and fluid flow problems using standard finite element software

MBA				
SEMESTER	UNIVERSITY	SUBJECT NAME	CO CODE	COURSE OUTCOME
<b>T1</b>	11	QUANTITATIVE TECHNIQUES	CO1	Students will be able to remember the basic concepts of quality.
			CO2	Students will be able to understand the concepts of six sigma.
			CO3	Students will be able to analyse concepts and culture of Total quality management.
			CO4	Students will be able to construct quality tools in quality – related problems.
			CO5	Students will be able to summarize quality awards and certification.
	12	ORGANIZATIONAL BEHAVIOUR	CO6	The students will have the clarity regarding the basic approaches to management, fundamental
			CO1	The students will be able to understand the dynamics behind the behavior of people in the organization
			CO2	The students will be able to analyse and predict the behavior of individuals and influence it for the
			CO3	The students will be able to drive teamwork in the organization and lead them effectively to the
	13	ECONOMICS FOR MANAGERS	CO4	The students will be able to be a role model and capable of managing the negative behavioural issues of
			CO1	Students will be able to describe basic economic laws
			CO2	Students will be able to analyse business situations in terms of the economic implications
			CO3	Students will be able to Examine the cost-output relationships and pricing
			CO4	Students will be able to understand market structures
	14	BUSINESS COMMUNICATION	CO5	Students will be able to evaluate managerial decision
			CO1	The students will be able to recall the concepts of communication, negotiation, crisis management and
			CO2	The students will be able to understand the concepts of oral communication , conversation, listening
			CO3	The students will be able to describe written communication concepts including 3x3 writing and
			CO4	The students will be able to analyse the different types of business letters, reports, messages, proposals
	15	ACCOUNTING FOR MANAGERS	CO5	The students will be able to evaluate case studies, approaches and process involved.
CO6			Students will be able to understand the basic concepts of accounting	
CO1			Students will be able to understand Companies Act 2013 and how to prepare financial statement of	
CO2			Students will be able to analyse the financial statements through ratio analysis	
CO3			Students will be able to prepare fund flow and cash flow statements of companies	
<b>T2</b>	21	ORGANIZATIONAL BEHAVIOUR II	CO4	students will be able to understand the concepts of cost and management accounting and cost control
			CO1	Students will be able to describe the CSR activities and socio-economic implications of Indian
			CO2	Students will be able to understand the economic growth, poverty and inequality prevailing in India
			CO3	Students will be able to solve the problem of socio - cultural Environment of business
			CO4	Students will be able to analyse various renewable and non renewable resources
	22	BUSINESS ENVIRONMENT	CO5	Students will be able to evaluate sustainable development & environmental management systems
			CO1	Students will be able to impart to the students knowledge about Business Environment
			CO2	Students will be able to understand important factors of business environment
			CO3	Students will be able to design appropriate business strategies
			CO4	Students will be able to analyse various methods of market entry
	23	MARKETING MANAGEMENT I	CO5	Students will be able to understand suitable to the environment.
			CO1	Students will be able to describe the concepts of Marketing and selling and nature and scope of
			CO2	Students will be able to understand types of consumer behaviour
			CO3	Students will be able to Examine the product differentiation strategies
			CO4	Students will be able to analyse the concepts of marketing decisions and new product development
	24	OPERATIONS MANAGEMENT	CO5	Students will be able to evaluate the various pricing decisions
			CO1	The student will be able to describe production, operations functions and process analysis
			CO2	The student will be able to understand productivity, capacity and quality concepts
			CO3	The student will be able to understand materials management and inventory concepts
			CO4	To familiarise the students with BEP, facility planning and supply chain concepts
25	FINANCIAL MANAGEMENT I	CO5	To develop an understanding of Master production scheduling, Japanese contributions , World Class	
		CO1	Students will be able to understand the basic concepts of financial management	
		CO2	Students will be able to understand time value of money and its importance	
		CO3	Students will be able to analyse the source of finance	
		CO4	Students will be able to identify the cost of capital and capital structure of companies	
26	BUSINESS LAW	CO5	students will be able to understand investment decisions in projects	
		CO1	Students will be able to describe the fundamentals of law	
		CO2	Students will be able to understand Companies act 1956	
		CO3	Students will be able to Examine the prospectus of a company	
		CO4	Students will be able to analyse the concepts of partnership business	
31	MARKETING MANAGEMENT II	CO5	Students will be able to evaluate the Industrial dispute act	
		CO1	Students will be able to describe various distribution channels and the concept of e commerce.	
		CO2	Students will be able to understand the various promotion decisions and marketing communications	
		CO3	Students will be able to analyse various sales promotion technique and competitor analysis	
		CO4	Students will be able to analyse various methods of service marketing techniques	
	32	FINANCIAL MANAGEMENT II	CO5	Students will be able to summarize the emerging trends in marketing.
			CO1	Students will be able to understand the basic concepts of financial performance analysis
			CO2	Students will be able to understand capital structure planning
			CO3	Students will be able to understand and analyse dividend policy and models
			CO4	Students will be able to identify the role of working capital management
	33	HUMAN RESOURCE MANAGEMENT	CO5	students will be able to understand emerging areas in financial management
			CO1	Students will be able to understand business problems and find ways to solve them
			CO2	Students will be able to manage human resources in a multitude of workplace environments
			CO3	Students will be able to analyse relevant data to solve business problems
			CO4	Students will be able to construct the various scope of Human Resource Management
			CO5	Students will be able to summarize Industrial Relations.

**T3**

34	BUSINESS RESEARCH METHODS	CO1	The students will be able to recall the concepts of business research, process,types of research	
		CO2	The students will be able to understand the formulation of research design	
		CO3	The students will be able to describe the measurement and scaling techniques	
		CO4	The students will be able to analyse data collection tools and techniques	
		CO5	The students will be able to evaluate the data analysis process and reporting techniques	
	35	MANAGEMENT INFORMATION SYSTEMS	CO6	Students will be able to describe various distribution channels and the concept of e commerce.
			CO1	Students will be able to understand the various database types and its advantages
			CO2	Students will be able to analyse various database concepts and database models
			CO3	Students will be able to analyse various methods of wireless security
	36	OPERATIONS RESEARCH	CO4	Students will be able to summarize the emerging trends in enterprise information systems.
			CO1	Students will be able to describe the concepts of operations research and Linear Programming
			CO2	Students will be able to understand allocation problem models.
			CO3	Students will be able to Examine the duality in LPP and the concepts of sensitivity analysis.
			CO4	Students will be able to analyse the concepts of decision theory and Network analysis.
	37	STRATEGIC MANAGEMENT	CO5	Students will be able to evaluate the Game theory, Replacement analysis and queuing Model.
			CO1	The students will have the clarity regarding the theories and practices governing the Strategy
			CO2	The course the students will have the practical knowledge of strategy implementation and control
			CO3	The students will have the competency to analyse and interpret the environmental factors and their
			CO4	The students will have the expertise to analyse competitor strategies.
	38	MANAGERIAL SKILLS III	CO5	The students will possess the competence to take decisions based on the portolio analysis.
CO1			Students will be able to enhancement of the holistic development of students and improvement of	
CO2			Students will be able to develop inter personal skills and be an effective goal oriented team player,	
CO3			Students will be able to develop professionals with idealistic, practical and moral values and to	
CO4			Students will be able to develop communication and problem solving skills, To develop time	

**T4**

41	INTERNATIONAL BUSINESS	CO5	Students will be able to re-engineer attitude and understand its influence on behavior,To get over the	
		CO1	Students will be able to understand Internationao Business Environment	
		CO2	Students will be able to understand various market selection and market entry process	
		CO3	Students will be able to understsnd role of global trade and foreign investment i	
		CO4	Students will be able to describe the role of foreign direct investment	
	42	BUSINESS ANALYTICS	CO5	Students will be able to summarize trends in international business
			CO1	Students will be able to describe Evolution and scope of Business Analytics
			CO2	Students will be able to understand Financial and operational analytics
			CO3	Students will be able to analyse Human resource analytics.
			CO4	Students will be able to construct the various scope of Marketing and web analytics
	FNT 404	COMMERCIAL BANKING SYSTEM	CO5	Students will be able to summarize predictive analytics and application of business.
			CO1	Describe structure of commercial banking in India and changing scenario in commercial Banking.
			CO2	Explain Innovations in banking, Negotiable instruments and Management of NPA
			CO3	Classify Various E-Banking facilities
			CO4	Outline functions of RBI and various Banking Sector Reforms
	FNT401	FINANCIAL MARKETS AND SERVICES	CO5	Enlist SEBI regulations on merchant banks.
			CO1	Students will be able to describe concepts of financial systems in India
			CO2	Students will be able to understand the various money market and capital market concepts
			CO3	Students will be able to analyse the various money market instruments in India
			CO4	Students will be able to construct the various scope of financial services
HRT 402	ORGANIZATIONAL CHANGE AND DEVELOPMENT	CO5	Students will be able to summarize the venture capital funds and mutual funds in India	
		CO1	The students will be able to accurately identify and describe the historical and contemporary	
		CO2	The students will be able to Recognize common symptoms and reactions to change in the workplace	
		CO3	The students will be able to Describe the main principles and characteristics of the multiple models for	
		CO4	The students will be able to Evaluate and assess an organizational change program.	
HRT403	INDUSTRIAL RELATIONS AND LABOUR LAWS	CO5	The students will be able to Develop an awareness of influencing and facilitating change.	
		CO6	The students should be able explain the concept of industrial relations	
		CO1	The students should be able to identify the necessity of strikes, lockouts, layoff and retrenchment	
		CO2	The students should be able differentiate conciliation, arbitration adjudication	
		CO3	The students should be able evakuate the theories of labour welfare and social justice	
MKTT404	SERVICES MARKETING	CO4	The students should be able understanding the objectives and key provisions of industrial dispute act	
		CO1	The students will be able to recall the categories of services , traditional and extended service mix,	
		CO2	The students will be able to list the expectation and perception development of consumersm=, recall	
		CO3	The students will be able to understand service demand management , new service development, and	
		CO4	The students will be able to classify and explain the models of service stimulus models and manage	
MKTT406	LES AND DISTRIBUTION MANAGEMENT	CO5	The students will be able to analyse service quality management tools, service failure and recovery and	
		CO1	Students will be able to remember the role of sales management	
		CO2	Students will be able to understand the various sales process and marketing channels	
		CO3	Students will be able to analyse the various sales force control systems	
		CO4	Students will be able to describe the role and functions of intermediaries	
OMT 406	LOGISTICS AND MATERIALS HANDLING	CO5	Students will be able to summarize distribution systems and logistics	
		CO1	Students will be able to remember the internal logistics management and integrated logistics system.	
		CO2	Students will be able to understand the elements of logistics and supply chain management.	
		CO3	Students will be able to analyse logistics information system.	
		CO4	Students will be able to construct Transportation in logistics and supply chain.	
OMT 403	QUALITY MANAGEMENT	CO5	Students will be able to summarize the materials handling in an organization.	
		CO6	Students will be able to remember the basic concepts of quality.	
		CO1	Students will be able to understand the statistical quality control techniques.	
		CO2	Students will be able to analyse concepts and process of Benchmarking.	
		CO3	Students will be able to construct the methodology of six sigma.	
51	ENTREPRENUERSHIP	CO4	Students will be able to summarize quality system and certification.	
		CO1	Understand the basic concept of entrepreneurship	
		CO2	Students will be aware of entrepreneurial ideation and decision process.	
		CO3	Students will be familiarise the students with the ground realities of starting & managing their own	

**T5**

T5	52	BUSINESS ETHICS AND CORPORATE GOVERNANCE	CO4	Students will be recognise SSI initial processes and business management
			CO5	Students will be able to develop the achievement motivation and Entrepreneurial competency and also
			CO1	The students will have clarity regarding basic concepts of Ethics and will have the conviction
			CO2	The students will aquire clarity regarding the Basic Philosophies behind the Business Ethics
			CO3	The students will become aware of the ethical issues in different functional areas and the solutions to
	FINT508	SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT	CO4	The students will be competent enough to design programmes to ensure ethical business in the
			CO5	The students will be able to design systems to ensure good Corporate Governance
			CO1	Students will be able to understand and do Fundamental Analysis and valuation of shares
			CO2	Students will be able to understand and practice Technical analysis
			CO3	Students will be able to understand Efficient market Theories
	FINT511	NON BANKING AND FINANCIAL COMPANIES AND MICROFINANCE	CO4	Students will be able to understand how to Analyze, Select, revise and evaluate portfolios
			CO5	Students will be able to understand how to develop an efficient portfolio based upon risk and return
			CO1	Students will be able to remember the structure and fuction of Indian financial system.
			CO2	Students will be able to understand the classification of Non banking financial companies and Micro
			CO3	Students will be able to analyse sources of finance and Investment policies of Non banking Financial
	HRT509	LEADERSHIP POWER AND INFLUENCE	CO4	Students will be able to construct the legal and regulatory framework of Non banking financial
			CO5	Students will be able to summarize financial services and products that are offered through micro
			CO1	Students will be able to develop leadership quality required in a business organization
			CO2	Students will be able to assess their own and others value orientation
			CO3	Students will be able to analyse differet leadership styles
	HRT510	NEGOTIATION AND CONFLICT RESOLUTION	CO4	Students will be able to develop leadership process competencies
			CO5	Students will be able to understandqualities required for a successful leader.
			CO1	Students will be able to remember Intergroup relations and conflicts
			CO2	Students will be able to understand the various negotiation types
			CO3	Students will be able to analyse Collecive bargaining and distributive bargaining
	MKTT511	CUSTOMER RELATIONSHIP MANAGEMENT	CO4	Students will be able to describe the role and functions conflict and disputes resolution and Industrial
			CO5	Students will be able to summarize trends in industrial conflict
			CO1	To familiarize the students with the changes in the corporate and global market
			CO2	To help the students understand the components of automation for CRM purposes
			CO3	The students will be able to recall the process of CRM
	MKTT508	BRAND MANAGEMENT	CO4	To familiarize the students with the application service provider
			CO5	To develop an understanding of various CRM tools
			CO1	Students will be able to remember the concept of branding and its subdivisions
			CO2	Students will be able to understand the various brand strategy decisions and brand portfolios
			CO3	Students will be able to analyse the various brand personality
	OMT512	SIX SIGMA AND TQM	CO4	Students will be able to describe the brand equity and brand associations
			CO5	Students will be able to summarize brand equity measurement and Management system.
			CO1	Students will be able to remember the basic concepts of quality.
			CO2	Students will be able to understand the concepts of six sigma.
			CO3	Students will be able to analyse concepts and culture of Total quality management.
	OMT510	INNOVATION MANAGEMENT AND NEW PRODUCT DEVELOPMENT	CO4	Students will be able to construct quality tools in quality – related problems.
			CO5	Students will be able to summarize quality awards and certification.
			CO1	The students should be able to understand innovation and its importance as a strategic initiative in an
			CO2	The student will be able to learn the approach for new product development and apply NPD methods
			CO3	The student will learn why some new products fail or succeed
	61	CROSS CULTURAL MANAGEMENT	CO4	To make students aware of organisational goals and develop strategic alliances
			CO5	To make students know about values in leadership by inculcating knowledge about remedy against
			CO1	Students will be able to describe Cultural Environment of Business
			CO2	Students will be able to explain Cross-cultural Marketing
			CO3	Students will be able to understand Cross-cultural HRM
	FINT615	INSURANCE MANAGEMENT	CO4	Students will be able to describe Cross – cultural Communication and Negation
			CO5	Students will be able to get knowledge Cross-cultural Operations Management
			CO1	This course intends to provide a basic understanding of the insurance mechanism
			CO2	Students will be able to understand the concept of insurance and how it is used to cover risk
			CO3	Students will be able to understand insurance contracts and risks associated with it
HRT614	HR ANALYTICS	CO4	Students will be able to understand the operation and management of insurance entities	
		CO5	Students will be able to develop skills to facilitate insurance underwriting, claims settlement, loss	
		CO1	Students will be able to remember the concept of Human Resource Analytics	
		CO2	Students will be able to understand the various staffing utility concepts and measures.	
		CO3	Students will be able to analyse the various absenteeism cost and seperation	
MKTT614	BtoB MARKETING	CO4	Students will be able to describe the employee turnover	
		CO5	Students will be able to summarize employee health wellness and welfare.	
		CO1	The students will be able to recall the components of industrial and consumer markets and compare	
		CO2	The students will be able to list the factors of organisational environment, roles in buying process and	
		CO3	The students will be able to explain industrial market segmentation, targeting, positioning and	
OMTT616	BUSINESS SUSTAINABILTTY	CO4	The student will be able to classify and explain industrial products and pricing	
		CO5	The students will be able to summarise marketing communication and logistic decisions	
		CO1	Students will be able to remember the climate change and the potential impact of climate change.	
		CO2	Students will be able to understand the Carbon mitigation and carbon adaptation.	
		CO3	Students will be able to analyse energy resources and waste management.	
MCA		CO4	Students will be able to construct the tripple bottom line concept and lean start – up.	
		CO5	Students will be able to summarize environmental laws and legislations.	

SEMESTER	UNIVERSITY	SUBJECT NAME	CO CODE	COURSE OUTCOME
20MCA101		MATHEMATICAL FOUNDATIONS FOR COMPUTERS	CO1	Understand mathematical reasoning in order to read, comprehend and construct mathematical
			CO2	Count or enumerate objects and solve counting problems and analyze algorithms
			CO3	Solve problems in almost every conceivable discipline using graph models
			CO4	Solve the linear system of equations and Calculate the eigen values and eigen vectors of matrices

<b>S1</b>	20MCA103	FUNDAMENTALS AND COMPUTER ARCHITECTURE	CO5	Apply the principles of correlation and regression in practical problems
			CO1	Apply the basics of digital electronics to design and realize simple combinational logic circuits
			CO2	Apply the digital electronics principles to design sequential logic circuits.
			CO3	Understand the different design features of computer architecture, Five key components of a computer,
			CO4	Understand Processor logic design conventions and data path, pipelining and hazards, I/O
			CO5	Understand and different types of memories - RAM, ROM, Cache memory, virtual memory etc. Apply
	20MCA105	ADVANCED DATA STRUCTURES	CO6	Understand the concept of single board computers like Arduino, Raspberry Pi etc. and apply the same
			CO1	Remember the Basic Data Structures and understand the Set Data Structure and its implementation.
			CO2	Understand Advanced Tree Structures for the design of efficient algorithms
			CO3	Understand Advanced Heap Structures suitable for solving Computational problems involving
			CO4	Understand Advanced Graph algorithms suitable for solving advanced computational problems
	20MCA107	ADVANCED SOFTWARE ENGINEERING	CO5	Understand the basic operation of Blockchaining along with the data structures used in it and the
			CO1	Get a full view of the Software life cycle
			CO2	Gain a deep knowledge of Software Planning, Analysis and Design and Software Engineering Models
			CO3	Have a great comprehension of Coding Practices, Version Control using 'git' and software Quality
			CO4	Acquire ample grasp of Design Patterns
			CO5	Acquire ample grasp of Design Patterns
			CO6	Start using Agile Methodology
	20MCA131	PROGRAMMING LAB	CO7	Begin to apply CI/CD techniques in Software development
			CO1	Understands basics of Python Programming language including input/output functions, operators,
			CO2	Implement decision making, looping constructs and functions
CO3			Design modules and packages - built in and user defined packages Implement object-oriented	
CO4			Implement object-oriented programming and exception handling.	
20MCA133	WEB PROGRAMMING LAB	CO5	Create files and form regular expressions for effective search operations on strings and FILES	
		CO1	Explore markup languages features and create interactive web pages using them	
		CO2	Learn and design client-side validation using scripting languages	
		CO3	Design front end web page and connect to the back-end databases	
		CO4	Do Client-side & Server-side scripting	
20MCA135	DATA STRUCTURES LAB	CO5	Develop Web Applications	
		CO1	Use Debuggers, Profilers and advanced Compiler options.	
		CO2	Implement the Set and Disjoint Set Data Structures	
		CO3	Understand the practical aspects of Advanced Tree Structures.	
		CO4	Realise Modern Heap Structures for effectively solving advanced Computational PROBLEMS	
<b>S2</b>	20MCA102	ADVANCED DATABASE MANAGEMENT SYSTEMS	CO5	Implement Advanced Graph algorithms suitable for solving advanced computational PROBLEMS
			CO1	Understand the fundamentals of relational database systems including: data models, database
			CO2	Analyze and apply the different normalization techniques.
			CO3	Assess the basic issues of transaction processing and concurrency control
			CO4	Understand the roles that databases play in organizations and familiarize with basic database storage,
			CO5	Understand the basics of query processing, object-oriented, distributed databases
	20MCA104	ADVANCED COMPUTER NETWORKS	CO6	Analyze non-relational database systems and structures and XML..
			CO1	Comprehend the terminology and concepts of basic communication model, analyse the protocol layers
			CO2	Understand and analyse the various transport layer protocols.
			CO3	Compare and contrast various routing algorithms in the network layer.
			CO4	Understand and analyse the concepts of link layer and physical layer.
	20MCA192	IPR AND CYBER LAWS	CO5	Understand how modern cellular and wireless networks work
			CO1	Explain the fundamentals of IPR and patents.
			CO2	Apply intellectual property related tools such as trademark and copyright to real problems.
			CO3	Discuss Industrial designs, trade secret and geographic Indications.
CO4			Describe laws governing cyberspace and analyze the role of Internet Governance in framing policies	
20MCA164	ORGANISATIONAL BEHAVIOUR	CO5	Discuss different types of cybercrimes and penalties under IT Act.	
		CO1	Identify managers' challenges and opportunities in applying OB concepts.	
		CO2	Analyse various characteristics of individual behaviour and its impact on organizational performance.	
		CO3	Acquire knowledge about the complexities associated with management of individual behaviour in the	
		CO4	Understand group behaviour and develop inter-personal skills and group dynamics.	
20MCA134	ADVANCED DBMS LAB	CO5	Understand organizational structures and analyze the behavioral implications of different	
		CO1	Design and build a simple relational database system and demonstrate competence with the	
		CO2	Apply PL/SQL for processing databases.	
		CO3	Comparison between relational and non-relational (NoSQL) databases and the configuration of	
		CO4	Apply CRUD operations and retrieve data in a NoSQL environment	
		CO5	Understand the basic storage architecture of distributed file systems	
20MCA132	OBJECT ORIENTED PROGRAMMING LAB	CO6	Design and deployment of NoSQL databases with real time requirements	
		CO1	Understand object-oriented concepts and design classes and objects to solve problems	
		CO2	Implement arrays and strings.	
		CO3	Implement object-oriented concepts like inheritance, overloading and interfaces	
		CO4	Implement packages, exception handling, multithreading and generic programming. Use java.util	
		CO5	Develop applications to handle events using applets	
20MCA136	WORKING AND SYSTEM ADMINISTRATION	CO6	Develop applications using files and networking concepts	
		CO1	Install and configure common operating systems	
		CO2	Perform system administration tasks.	
		CO3	Install and manage servers for web applications.	
		CO4	Write shell scripts required for system administration	
20MCA201	DATA SCIENCE AND MACHINE LEARNING	CO5	Acquire skill sets required for a DevOps.	
		CO1	Discuss the fundamental concepts of data science and data visualization techniques	
		CO2	Explain the basics of machine learning and use lazy learning and probabilistic learning algorithms to	
		CO3	Describe decision trees, classification rules & regression methods and how these algorithms can be	
		CO4	Solve data science problems using neural networks and support vector machines.	
			CO5	Discuss clustering using k-means algorithm and evaluate & improve the performance of machine
			CO1	Discuss the basic concepts in computer algorithms and their analysis & design using Divide and

<b>S3</b>	20MCA203	DESIGN AND ANALYSIS OF ALGORITHM	CO2	Explain the concepts of Greedy Strategy and Dynamic Programming to use it in solving real world
			CO3	Explain the Branch & Bound technique, Backtracking technique and Lower bounds
			CO4	Describe the fundamental concepts of Computational Complexity and Network Flows
			CO5	Discuss the concepts of Approximation and Randomised Algorithms
			CO1	Explain various types of security attacks, security mechanisms, security services and classical
	20MCA263	CYBER SECURITY AND CRYPTOGRAPHY	CO2	Make use of Symmetric and Asymmetric encryption techniques to solve cryptographic problems
			CO3	Describe the concepts of message authentication codes, hash functions and digital signing techniques
			CO4	Discuss security services in Application, Transport and Network layers.
			CO5	Explain common web application security vulnerabilities and various prevention mechanisms
			CO1	Explain the basic concepts of semantic web and social network ANALYSIS
	20MCA289	SOCIAL NETWORK ANALYSIS	CO2	Describe the ontology-based knowledge representation techniques in social network
			CO3	Discuss aggregation of social networks information and representation of social individuals and social
			CO4	Describe the structure of the Web and Facebook as a graph and the algorithms for searching and
			CO5	Explain the general architecture of a search engine and specifically the Google search engine
			CO1	Use different python packages to perform numerical calculations, statistical computations and data
	20MCA241	DATA SCIENCE LAB	CO2	Use different packages and frameworks to implement regression and classification algorithms
			CO3	Use different packages and frameworks to implement text classification using SVM and clustering
			CO4	Implement convolutional neural network algorithm using Keras framework.
			CO5	Implement programs for web data mining and natural language processing using NLTK
			CO1	Design and develop user interfaces for mobile apps using basic building blocks, UI components and
20MCA243	MOBILE APPLICATION DEVELOPMENT LAB	CO2	Write simple programs and develop small applications using the concepts of UI design, layouts and	
		CO3	Develop applications with multiple activities using intents, array adapter, exceptions and options	
		CO4	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes	
		CO5	Develop mobile applications using SQLite	
		CO1	Identify a real-life project which is useful to society / industry	
20MCA245	MINI PROJECT	CO2	Interact with people to identify the project requirements	
		CO3	Apply suitable development methodology for the development of the product / project	
		CO4	Analyse and design a software product / project	
		CO5	Test the modules at various stages of project development	
		CO6	Build and integrate different software modules	
		CO7	Document and deploy the product / project	
		CO1	Articulate the concepts in the core courses learned through this programme.	
20MCA242	COMPREHENSIVE VIVA	CO2	Attend technical interviews with confidence	
		CO3	Interpret questions and answer them with clarity	
		CO4	Make use of the concepts learned through this programme in future.	
		CO1	Annotate the ideas presented in technical papers	
20MCA24	SEMINAR	CO2	Comprehend a concept by referring different technical documents	
		CO3	Prepare technical documents	
		CO4	Present a topic before an audience	
		CO5	Interact with the audience Level	
		CO1	Identify a real-life project which is useful to society / industry	
20MCA246	MAIN PROJECT	CO2	Interact with people to identify the project requirements	
		CO3	Apply suitable development methodology for the development of the product / project	
		CO4	Analyse and design a software product / project	
		CO5	Test the modules at various stages of project development	
		CO6	Build and integrate different software modules	
		CO7	Document and deploy the product / project	
		CO6	Build and integrate different software modules	
CO7	Document and deploy the product / project			