Gharda Institute of Technology

YEAR / SEMESTER	Course Code	Course Title	COURSE COUTCOMES	Course Outcome Statements
FIRST YEAR SEMESTER-1 R19 Version	FEC101	Engineering Mathematics-I	CO1	Apply and Demonstrate the concepts of Complex Number, Successive Differentiation, Partial Differentiation, Applications of Partial Differentiation, Expansion of Functions, Numerical Methods to the problems arising in engineering formulation.
			CO2	Analyze and interpret the problems arising in engineering formulation using Complex Number, Matrices, Partial Differentiation, Expansion of Functions
			CO3	Apply the techniques of SciLab Programming to solve Linear, Non linear, transcendental equations and Extrimize the functions of two variables
			CO4	Express graphically, Mathematically and through writing the concept of Complex Number, Successive Differentiation, Partial Differentiation, Applications of Partial Differentiation, Expansion of Functions, Numerical Methods in Engineering and Technology.
	FEC102	Engineering Physics-I	CO1	Illustrate and apply the basic concepts of Semiconductor physics, Crystallography and engineering materials to solve basic engineering problems.

			CO2	Illustrate and apply the basic concepts of Interference, Quantum mechanics, Superconductors and Supercapacitors to solve basic engineering problems.
			CO3	Analysis different crystal structures using X-ray diffraction technique.
			CO4	Comprehend the concept of semiconductor physics and its applications in electronic devices.
			CO5	compare the properties of engineering materials for their current and future frontierapplications.
	FEL102	Engineering Physics-I Lab	CO1	Analysis the results obtained by performing the experimets based on interference.
			CO2	Demonstrate the concept of crystallography.
			CO3	Analysis the charaecteristics of various semiconductor devices.
			CO4	Express verbally, graphically and through writing the concept of Interference, Semiconductor physics and crystallography.
			CO5	Demonstrate management principles and apply it to one's own work, as a member and leader in a team, to manage projects.
	FEC103	Engineering Chemistry-I	CO1	Explain the concept of atomic and molecular orbital theory, Aromaticity of compound, Phase rule and solve basic engineering problems.

			CO2	Explain the concept of, chemistry of polymer and their application, methods of purification of water, intermolecular forces and critical phenomenon and solve basic engineering problems.
			CO3	Comprehend the concepts of atomic and molecular structure, polymer and water.
			CO4	Express graphically the concept of atom and molecular structure, phase rule, polymers and water
	FEL103	Engineering Chemistry-I Lab	CO1	Determine the hardness, chloride content, COD of sewage water, pH of the solution, viscosity of oil and metal ion concentration.
			CO2	Identify formulate and calculate the hardness, chloride content, COD of water, molecular weight of polymer.
			CO3	Perform experimentations using the safety techniques and skills necessary for engineering practices.
			CO4	Express verbally, graphically through writing the concepts of water, pH of the solutions, Sewage and metal ion concentration.
	FEC104	Engineering Mecahics	CO1	Illustrate the concept of force, momentum, different types of motion and its application with the help of free body diagram and kinematic relation.
			CO2	Demonstrate concept of friction and motion of particle and rigid body.

			CO3	Locate centroid of the body and correlate real life application to specific type of friction to estimate required force so as to overcome the friction.
			CO4	Analyze particles in motion using principle of velocity, acceleration force, work-energy and impulse momentum by plotting the relation.
	FEL104	Engineering Mecahics Lab	CO1	Verify equations of equilibrium of coplanar force system
			CO2	Verify law of moments
			CO3	Evaluate co-efficient of friction between the different surfaces in contact
			CO4	Demonstrate the types of collision/impact
	FEC105	Basic Electrical Engineering	CO1	Explain the construnctional features, operation of single phase transformer and appl various network theorem to determine circuit response behaviour.
			CO2	Comprehend and analyze single and three phase circuit.
			CO3	Illustrate working principle of single and three pahse machine and basic knowledge of AC circuit
			CO4	Comprehend the basic concepts of DC circuits, Transformer and electrical motor
			CO5	Express graphically the concepts of AC and DC
	FEL105	Basic Electrical Engineering Lab	CO1	Interpret and analyse the behaviour of DC circuit using network theorems.

			CO2	To determine basic electrical parameter by performing experiment on single phase AC Circuit
			CO3	Infer experimentally various electrical parameters of three phase citcuit.
			CO4	Verify and demonstrate the performance of single phase transformer and machine
			CO5	Apply electrical safety measures while performing experiment in lab
	FEL106	Basic Workshop Practice-I	CO1	Demonstrate the handling of different fitting tools.
			CO2	Explain installation of operating system and system device.
			CO3	Apply the knowledge of hardware maintenance to solve maintenance related problems.
			CO4	Identify the network components and perform basic networking and crimping.
			CO5	Demonstrate the turning operation with the help of a simple job.
FIRST YEAR SEMESTER-2	FEC201	Engineering Mathematics-II	CO1	Apply and Demonstrate the concepts of Differential Equations, Linear Differential Equations with constant coefficients, Numerical techniques, DUIS, Rectification, Beta & Gamma Functions, Multiple Integrals to the problems arising in engineering formulation.

			CO2	Analyze and interpret the problems arising in engineering formulation using Differential Equations, Rectification, Numerical techniques, Multiple Integrals.
			CO3	Write the program in SciLab to solve Ordinary Differential Equations and to evaluate Definite Integrals.
			CO4	Express graphically, Mathematically and through writing the concept of Rectification, Beta & Gamma Functions, Multiple Integrals.
	FEC202	Engineering Physics-I	CO1	Illustrate and apply the basic concepts of Diffraction, LASER, Optical Fiber and Nanotechnology to solve basic engineering problems.
			CO2	Illustrate and apply the basic concepts of Electrodynamic, Relativity and sensor physics to solve basic engineering problems.
			CO3	Relate the basic of electrodynamics to satellite communication and antenna theory.
			CO4	Interpret and explore basic sensing techniques for physical measurements in modern instrumentation.
			CO5	comprehend the concepts of relativity, LASER and optical fiber.
	FEL201	Engineering Physics-I Lab	CO1	Analysis the results obtained by performing the experimets based on diffraction.
			CO2	Measure and verify various properties of optical fiber and LASER.

			CO3	Analysis the charaecteristics of various sensors.
			CO4	Express verbally, graphically and through writing the concept of Diffraction, LASER, Optical fiber and sensors.
			CO5	Demonstrate management principles and apply it to one's own work, as a member and leader in a team, to manage projects.
	FEC203	Engineering Chemistry-I	CO1	Explain the concept of fuels, Green chemistry and solve basic engineering problems.
			CO2	Explain the concept of, Spectroscopy, Electrochemistry, Corrosion, and solve basic engineering problems.
			CO3	Comprehend the concepts of Corrosion, fuels
			CO4	Express graphically the concept of Spectroscopy, electrochemistry, corrosion and fuels
	FEL202	Engineering Chemistry-I Lab	CO1	Determine the moisture content, ash content, acid value, Saponification, flash point of lubricant, emf of the Cu-Zn system by potentiometer
			CO2	Identify formulate and calculate the moisture, acid value and Saponification value, ash content
			CO3	Synthesize a drug and biofuel.
			CO4	Perform experimentations using the safety techniques and skills necessary for engineering practices.
			CO5	Express verbally, graphically through writing the concepts of fuel, lubricant, drug, and biofuel.

FEC204	Engineering Graphics	CO1	Apply the basic principle of projections in projection of lines, planes, curves and solids.
		CO2	Apply the basic principles of projections in converting 3D view into 2D view.
		CO3	Apply the basic principle of sectional view in section of solids and orthographic projection.
		CO4	Visualise an object from the given two views and read a given drawing.
		CO5	Express graphically projection of various engineering components
FEL203	Engineering Graphics Lab	CO1	Express graphically projection of various engineering components.
		CO2	Apply basic AUTO CAD skill to draw different views of 3D object and isometric views from the given two views
		CO3	Create annotate, edit and plot drawing using basic AUTO CAD commands and features components.
		CO4	Apply the basic principles of projections in 2D drawing using a CAD software
FEC206	Professional Communication and Ethics-I	CO1	Illustrate the knowledge of Communication theory, vocabulary building and grammar, reading and writing skills, basic business correspondence, technical writing, personality development and social etiquettes.
		CO2	Use reading and writing skills for effective comprehension, summarization, paraphrasing and evaluation of texts

			CO3	Express verbally in effective business letters by applying rules of style, principles, structure, blocks in business organization and hard skills like technical writing.
			CO4	Apply the knowledge of interacting in all kinds of settings, displaying refined grooming and social skills.
	FEL205	Professional Communication and Ethics-I	CO1	Understand the knowledge of spoken discourse, professional presentation and academic essays.
			CO2	Apply the communication theory knowledge to compare it with results obtained by performing practicals of spoken discourse, professional presentation and academic essays individually and in groups and use soft skills techniques necessary for engineering practice.
	FEL206	Basic Workshop Practice-II	CO1	Understand the basic knowledge such as interpretation of job drawing, application of processes and operations to produce components from raw materials along with safety precautions to be taken during working.
			CO2	Use and perform the setting of hand tools like hacksaws, jack planes, chisels and gauges for construction of various joints, wood turning and modern wood turning methods.
			CO3	Carry out edge preparation for welding jobs and perform arc welding operations.

Gharda Institute of Technology

			CO4	Use different plumbing tools like spanners, wrenches, threading dies and demonstrate the preparation of a domestic pipe line.

COMPUTER ENGINEERING

YEAR / SEMESTER	Course Code	Course Title	COURSE COUTCOMES	Course Outcome Statements
SECOND YEAR / THIRD SEMESTER	CSC301	Engineering Mathematics-III	CO1	Demonstrate & Apply the concepts of Laplace & Inverse Laplace Transform to evaluate definite integrals, Fourier series to expand the periodic functions.
			CO2	Demonstrate & Apply the concepts of Analytic function to find orthogonal trajectories, harmonic conjugate, the concepts of correlation & regressions, Bayes theorem & various probability distributions in the real life problems.
			CO3	Analyze and interpret the problems arising in engineering formulation using Laplace & Inverse Laplace Transform, Fourier series, Complex Variables, Correlation & Regression, Various probability distributions.

			CO4	Express graphically, mathematically functions of one domain into another domain using Laplace & Inverse Laplace Transform, periodic functions into sinusoidal components, statistical data using regression methods, various distribution into Moment generating function.
	CSC302	Discrete Structures and Graph Theory	CO1	1 Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.
			CO2	2 Ability to reason logically.
			CO3	3 Ability to understand relations, functions, Diagraph and Lattice.
			CO4	4 Ability to understand and apply concepts of graph theory in solving real world problems.
			CO5	5 Understand use of groups and codes in Encoding-Decoding
			CO6	6 Analyze a complex computing problem and apply principles of discrete mathematics to identify solutions
	CSC303	Data Structure	CO1	Describe various techniques for representation of the data in the real world.
			CO2	Choose & apply appropriate data structure as applied to specified problem definition

		CO3	implement various linear and nonlinear data structures.
		CO4	Implement various sorting and searching techniques.
CSC304	Digital Logic & Computer Architecture	CO1	To learn different number systems and basic structure of computer system.
		CO2	To demonstrate the arithmetic algorithms.
		CO3	To understand the basic concepts of digital components and processor organization.
		CO4	To understand the generation of control signals of computer
		CO5	To demonstrate the memory organization & to describe the concepts of parallel processing and different Buses.
CSC305	Computer Graphics	CO1	
		CO2	
		CO3	Apply geometric transformations, viewing and clipping on graphical objects.
		CO4	Explore 3-D geometric transformations, curve representation techniques and projections methods
		CO5	Explain visible surface detection techniques and Animation
CSL301	Data Structure Lab	CO1	Students will be able to implement linear data structures & be able to handle operations like insertion, deletion, searching and traversing on them.

			CO2	Students will be able to implement nonlinear data structures & be able to handle operations like insertion, deletion, searching and traversing on them
			CO3	Students will be able to choose appropriate data structure and apply it in various problems
			CO4	Students will be able to select appropriate searching techniques for given problems.
	CSL302	Digital Logic & Computer Architecture Lab	CO1	To understand the basics of digital components
			CO2	Design the basic building blocks of a computer: ALU, registers, CPU and memory
			CO3	To recognize the importance of digital systems in computer architecture
			CO4	To implement various algorithms for arithmetic operations
	CSL303	Computer Graphics Lab	CO1	Implement various output and filled area primitive algorithms
			CO2	Apply transformation, projection and clipping algorithms on graphical objects.
			CO3	Perform curve and fractal generation methods.
			CO4	Develop a Graphical application/Animation based on learned concept
	CSL304	Skill base Lab course:Object	CO1	To apply fundamental programming constructs.

		Oriented Programming with Java	CO2	To illustrate & elaborate the concept of packages, classes, objects, strings and arrays.
			CO3	To implement the concept of inheritance, interfaces, exception handling and multithreading.
			CO4	To develop GUI based application.
	CSM301	Mini Project – 1 A	CO1	Identify Social and reserach needs and apply knwledge to give solutionsn in a group
			CO2	Develop interpersonal, skills aling with written and oral communication
			CO3	Use standard norms of engineering practices
			CO4	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
			CO5	Demonstrate project management principles during project work.
SECOND YEAR / FORTH SEMESTER	CSC401	Applied Mathematics-IV	CO1	Demonstrate & Apply the concepts of Matrix Algebra to calculate the eigenvalues, eigenvectors, function of square matrix, inverse of matrix, Cauchy's theorems to evaluate various contour integrals, z-transform to convert sequences into rational function.

			CO2	Demonstrate & Apply the concepts of probability distributions & sampling techniques in the real life problems, Simplex, dual simplex methods, big M method to optimize linear functions and NLPP techniques to optimize non linear function with constraints.
			CO3	Analyze and interpret the problems arising in engineering formulation using matrices, z-transform, Linear & Non-linear Programming Problems, Probability distributions & sampling theory.
			CO4	Express graphically, mathematically functions of one domain into another domain using z & Inverse z-transform, the functions in terms of Laurent's & Taylor's series, matrix into diagonal form & function of matrix, real life problems using LPP, NLPP techniques & sampling techniques
	CSC402	Analysis of Algorithm	CO1	1 Analyze the running time and space complexity of algorithms.
			CO2	2 Describe, apply and analyze the complexity of divide and conquer strategy.

			CO3	3 Describe, apply and analyze the complexity of greedy strategy.
			CO4	4 Describe, apply and analyze the complexity of dynamic programming strategy.
			CO5	5 Explain and apply backtracking, branch and bound.
			CO6	6 Explain and apply string matching techniques
	CSC403	Database Management System	CO1	Understand different data models & schema in DBMS to design normalized database.
			CO2	Solve problem statement by using SQL with considering Integrity ,Security and Query processing in database.
			CO3	Understand the concept of transaction, Concurrency and recovery
	CSC404	Operating System	CO1	Understand the objectives, functions and structure of OS
			CO2	Analyze the concept of process management and evaluate performance of processscheduling algorithms.
			CO3	Understand and apply the concepts of synchronization and deadlocks

			CO4	Evaluate performance of Memory allocation and replacement policies
			CO5	Understand the concepts of file management.
	CSC405	Microprocessor	CO1	Describe core concepts of 8086 microprocessor
			CO2	Interpret the instructions of 8086 and write assembly and Mixed language programs.
			CO3	Design 8086 based system using memory and peripheral chips.
			CO4	Appraise the architecture of advanced processors and understand hyperthreading technology
	CSL401	Analysis of Algorithm Lab	CO1	Implement the algorithms using different approaches.
			CO2	2 Analyze the complexities of various algorithms.
			CO3	3 Compare the complexity of the algorithms for specific problem.
	CSL402	Database Management System Lab	CO1	Understand different data models & schema in DBMS to design normalized database.

		CO2	Solve problem statement by using SQL with considering Integrity ,Security and Query processingin database.
		CO3	Understand the concept of transaction, Concurrency and recovery
CSL403	Operating System Lab	CO1	Demonstrate basic Operating system Commands, Shell scripts, System Calls and API wrt Linux
		CO2	Implement various process scheduling algorithms and evaluate their performance.
CSL404	Microprocessor Lab	CO1	Describe core concepts of 8086 microprocessor
		CO2	Interpret the instructions of 8086 and write assembly and Mixed language programs.
		CO3	Design 8086 based system using memory and peripheral chips.
		CO4	Appraise the architecture of advanced processors and understand hyperthreading technology
CSL405	Skill Base Lab Course: Python Programming	CO1	Describe syntax and semantics in Python
		CO2	Illustrate different file handling operations
		CO3	Interpret object oriented programming in Python
		CO4	Design GUI Applications in Python
		CO5	Express proficiency in the handling Python libraries for data science

Gharda Institute of Technology

	CSM401	Mini Project 1-B	CO1	Identify Social and reserach needs and apply knwledge to give solutionsn in a group
			CO2	Develope interpersonal, skills aling with written and oral communication
			CO3	Use standard norms of engineering practices
			CO4	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
			CO5	Demonstrate project management principles during project work.
SECOND YEAR / THIRD SEMESTER	CSC301	Applied Mathematics -III	CO1	Demonstrate & Apply the concepts of Laplace & Inverse Laplace Transform to evaluate definite integrals, Fourier series to expand the periodic functions.
			CO2	Demonstrate & Apply the concepts of Analytic function to find orthogonal trajectories, harmonic conjugate, the concepts of correlation & regressions, Bayes theorem & various probability distributions in the real life problems.
			CO3	Analyze and interpret the problems arising in engineering formulation using Laplace & Inverse Laplace Transform, Fourier series, Complex Variables, Correlation & Regression, Various probability distributions.

			CO4	Express graphically, mathematically functions of one domain into another domain using Laplace & Inverse Laplace Transform, periodic functions into sinusoidal components, statistical data using regression methods, various distribution into Moment generating function.
CSC302	Digital Logic Design and Analysis		CO1	To learn different number systems and basic structure of computer system.
			CO2	To demonstrate the arithmetic algorithms.
			CO3	To understand the basic concepts of digital components and processor organization.
			CO4	To understand the generation of control signals of computer
			CO5	To demonstrate the memory organization & to describe the concepts of parallel processing and different Buses.
CSC303	Discrete Mathematics		CO1	1 Understand the notion of mathematical thinking, mathematical proofs and to apply them in problem solving.
			CO2	2 Ability to reason logically.
			CO3	3 Ability to understand relations, functions, Diagraph and Lattice.

			CO4	4 Ability to understand and apply concepts of graph theory in solving real world problems.
			CO5	5 Understand use of groups and codes in Encoding-Decoding
			CO6	6 Analyze a complex computing problem and apply principles of discrete mathematics to identify solutions
	CSC304	Electronic Circuits and Communication Fundamentals	CO1	To understand the use of semiconductor devices in circuits and analyze them.
			CO2	To understand importance of oscillators and power amplifiers in communication system.
			CO3	To understand basic concepts of operational amplifier and their applications.
			CO4	To understand the fundamental concepts of electronic communication
			CO5	To apply knowledge of electronic devices and circuits to communication applications.
	CSC305	Data Structures	CO1	Describe various techniques for representation of the data in the real world.
			CO2	Choose & apply appropriate data structure as applied to specified problem definition
			CO3	implement various linear and nonlinear data structures.
			CO4	Implement various sorting and searching techniques.
	CSL301	Digital System Lab	CO1	To understand the basics of digital components

			CO2	Design the basic building blocks of a computer: ALU, registers, CPU and memory
			CO3	To recognize the importance of digital systems in computer architecture
			CO4	To implement various algorithms for arithmetic operations
CSL302	Basic Electronics Lab		CO1	To understand the use of semiconductor devices in circuits and analyze them.
			CO2	To understand importance of oscillators and power amplifiers in communication system.
			CO3	To understand basic concepts of operational amplifier and their applications.
			CO4	To understand the fundamental concepts of electronic communication
			CO5	To apply knowledge of electronic devices and circuits to communication applications.
CSL303	Data structure Lab		CO1	Students will be able to implement linear data structures & be able to handle operations like insertion, deletion, searching and traversing on them.
			CO2	Students will be able to implement nonlinear data structures & be able to handle operations like insertion, deletion, searching and traversing on them
			CO3	Students will be able to choose appropriate data structure and apply it in various problems

			CO4	Students will be able to select appropriate searching techniques for given problems.
	CSL304	OOPM(Java) Lab	CO1	To apply fundamental programming constructs.
			CO2	To illustrate & elaborate the concept of packages, classes, objects, strings and arrays.
			CO3	To implement the concept of inheritance, interfaces, exception handling and multithreading.
			CO4	To develop GUI based application.
SECOND YEAR / FORTH SEMESTER	CSC401	Engineering Mathematics- IV	CO1	Demonstrate & Apply the concepts of Matrix Algebra to calculate the eigenvalues, eigenvectors, function of square matrix, inverse of matrix, Cauchy's theorems to evaluate various contour integrals, z-transform to convert sequences into rational function.
			CO2	Demonstrate & Apply the concepts of probability distributions & sampling techniques in the real life problems, Simplex, dual simplex methods, big M method to optimize linear functions and NLPP techniques to optimize non linear function with constraints.

			CO3	Analyze and interpret the problems arising in engineering formulation using matrices, z-transform, Linear & Non-linear Programming Problems, Probability distributions & sampling theory.
			CO4	Express graphically, mathematically functions of one domain into another domain using z & Inverse z-transform, the functions in terms of Laurent's & Taylor's series, matrix into diagonal form & function of matrix, real life problems using LPP, NLPP techniques & sampling techniques
	CSC402	Analysis of Algorithms	CO1	Analyze the running time and space complexity of algorithms.
			CO2	Describe, apply and analyze the complexity of divide and conquer strategy.
			CO3	Describe, apply and analyze the complexity of greedy strategy.
			CO4	Describe, apply and analyze the complexity of dynamic programming strategy.
			CO5	Explain and apply backtracking, branch and bound.
			CO6	Explain and apply string matching techniques
	CSC403		CO1	To describe basic structure of the computer system.

		Computer Organization and Architecture	CO2	To demonstrate the arithmetic algorithms for solving ALU operations.
			CO3	To describe instruction level parallelism and hazards in typical processor pipelines.
			CO4	To describe superscalar architectures, multi-core architecture and their advantages
			CO5	To demonstrate the memory mapping techniques.
	CSC404	Computer Graphics	CO3	Apply geometric transformations, viewing and clipping on graphical objects.
			CO4	Explore 3-D geometric transformations, curve representation techniques and projections methods
			CO5	Explain visible surface detection techniques and Animation
	CSC405	Operating System	CO1	Understand the objectives, functions and structure of OS
			CO2	Analyze the concept of process management and evaluate performance of processscheduling algorithms.
			CO3	Understand and apply the concepts of synchronization and deadlocks
			CO4	Evaluate performance of Memory allocation and replacement policies
			CO5	Understand the concepts of file management.

Gharda Institute of Technology

CSL401	Analysis of Algorithms Lab	CO1	Analyze the complexities of various problems in different domains.
		CO2	Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains.
		CO3	Develop the efficient algorithms for the new problem with suitable designing techniques.
		CO4	Implement the algorithms using different strategies.
CSL402	Computer Graphics Lab	CO1	Implement various output and filled area primitive algorithms
		CO2	Apply transformation, projection and clipping algorithms on graphical objects.
		CO3	Perform curve and fractal generation methods.
		CO4	Develop a Graphical application/Animation based on learned concept
CSL403	Processor Architecture Lab	CO1	Assemble personal computer
		CO2	Design the basic building blocks of a computer: arithmetic-logic unit, registers, central processing unit, and memory.
		CO3	Implement various algorithms like Booth"s algorithm for arithmetic operations
		CO4	Describe various I/O buses with merits and demerits.
CSL404	Operating System Lab	CO1	Demonstrate basic Operating system Commands, Shell scripts, System Calls and API wrt Linux

Gharda Institute of Technology

			CO2	Implement various process scheduling algorithms and evaluate their performance.
	CSL405	Open Source Tech Lab	CO1	Describe syntax and semantics in Python
			CO2	Illustrate different file handling operations
			CO3	Interpret object oriented programming in Python
			CO4	Design GUI Applications in Python
			CO5	Express proficiency in the handling Python libraries for data science

CIVIL ENGINEERING

SE / 3rd SEMESTER	CEC 301 Engineering Mathematics-III	CO1	Apply the concept of Laplace transform to solve the real integrals in engineering problems.
		CO2	Apply the concept of inverse Laplace transform of various functions in engineering problems.
		CO3	Expand the periodic function by using Fourier series for real life problems and complex engineering problems.
		CO4	Find orthogonal trajectories and analytic function by using basic concepts of complex variable theory.
		CO5	Apply Matrix algebra to solve the engineering problems.
		CO6	Solve Partial differential equations by applying numerical solution and analytical methods for one dimensional heat and wave equations.
	CEC 302 Mechanics of Solids	CO1	Evaluate stress - strain behavior of elastic members and thin cylinders subjected to internal pressure.

		CO2	Draw variation of axial force, shear force and bending moment diagram for statically determinate beams and frames.
		CO3	Calculate Moment of Inertia for cross sections and analyse the material response under the action of shear and the effect of flexure (bending).
		CO4	Predict the angle of twist and shear stress developed in torsion and compute direct and bending stresses developed in the cross section of centrally and eccentrically loaded columns.
		CO5	Locate principal planes in members and calculate principal stresses using analytical and graphical method and to calculate strain energy stored in members due to elastic deformation
		CO6	Evaluate slope and deflection of beams supported and loaded in different ways.
	CEC 303 Engineering Geology	CO1	Explain the concepts of Geology and its application for safe, stable and economic design of any civil engineering structure.
		CO2	Interpret the lithological characters of the rock specimen and distinguish them on the basis of studied parameters
		CO3	Describe the structural elements of the rocks and implement the knowledge for collection and analysis of the geological data.
		CO4	Interpret the geological conditions for the dam site and calculate RQD for the assessment of rock masses.
		CO5	Analyze the given data and suggest rock mass rating for assessment of tunnelling conditions

		CO6	Interpret the causes of geological hazards and implement the knowledge for their prevention
	CEC304 Architectural Planning & Design of Buildings	CO1	Remember and recall the intricate details of building design and drawing.
		CO2	Understand the basic concepts of building design and drawing.
		CO3	Learn how to apply professional ethics and act responsibly pertaining to the norms of building design and drawing practices.
		CO4	Identify, analyze, research literate and solve complex building design and drawing problems.
		CO5	Have new solutions for complex building design and drawing problems
		CO6	Effectively communicate ideas, related to building design and drawing, both orally as well as in written format like reports & drawings
	CEC305 Fluid Mechanics - I	CO1	Describe various properties of fluids and types of flow
		CO2	Determine the pressure difference in pipe flows, application of Continuity equation and Bernoulli's theorem to determine velocity and discharge
		CO3	Apply hydrostatic and dynamic solutions for fluid flow applications
		CO4	Analyse the stability of floating bodies
		CO5	Apply the working concepts of various devices to measure the flow through pipes and channels
		CO6	Explain the compressible flow, propagation of pressure waves and stagnation properties
		CO1	Transfer the plan from a drawing sheet to a 2-D drafting software

	CEL305 Skill Based Lab Course-I Computer Aided Drafting & Building Information Modelling	CO2	Visualize the various elements in the software like points, lines, polygons, etc. as objects of the real world and relate it with civil engineering components
		CO3	Apply civil engineering concepts to draft efficient civil engineering plans in accordance to various building bye laws and forms
		CO4	Conceptualize the space, logistic and statutory constraints in the real world to draw an efficient plan so that optimization is achieved
		CO5	Attach and retrieve information pertaining to various civil engineering components through 3-D modelling software
		CO6	Demonstrate a virtual walkthrough of buildings
SE / 4TH SEMESTER	CEC 401 Engineering Mathematics-IV	CO1	Apply the concept of Vector calculus to evaluate line integrals, surface integrals using Green's theorem, Stoke's theorem & Gauss Divergence theorem
		CO2	Use the concepts of Complex Integration for evaluating integrals, computing residues & evaluate various contour integrals.
		CO3	Apply the concept of Correlation, Regression and curve fitting to the engineering problems in data science
		CO4	Illustrate understanding of the concepts of probability and expectation for getting the spread of the data and distribution of probabilities.
		CO5	Apply the concept of probability distribution to engineering problems& Testing hypothesis of small samples using sampling theory

		CO6	Apply the concepts of parametric and nonparametric tests for analysing practical problems
	CEC402 Structural Analysis	CO1	Calculate axial forces in the Coplanartrusses by using Method of joints and method of sections and also calculate radial shear, normal thrust and bending moment in parabolic 3- Hinged arches
		CO2	Draw Influence Line Diagrams for axial forces in trusses, Reactions, SF and B M in beams and find their values when rolling loads are passing over them..
		CO3	Evaluate rotation and displacement at a joint of frames and deflection at any joint of truss and will be able to compute static and kinematic indeterminacy of structure.
		CO4	Apply Flexibility methods and make use of Clapeyron's Theorem to analyze the indeterminate structures
		CO5	Analyse the indeterminate structures such as beams & simple rigid jointed frames using direct stiffness method.
		CO6	Analyse the indeterminate structures using Moment Distribution as Stiffness method and make plastic analysis.
	CEC403 Surveying	CO1	Apply the principles of surveying and field procedures to conduct the various surveys
		CO2	Use various methods for taking linear and angular measurements
		CO3	Collect, record and analyse the field data for preparing drawings

	CO4	Explain the advancements in instruments and methods
	CO5	.Calculate the area of land and volume of earthwork
	CO6	Set out curves
CEC 404 Building Materials & Concrete Technology	CO1	To develop and implement the conceptual knowledge of building materials in the construction industry.
	CO2	Assess the properties of building stones and their classifications. Understand the concept of various methods of manufacturing of bricks and different types of concrete blocks.
	CO3	To expose students to various quality control aspects of civil engineering materials by performing different lab tests on materials.
	CO4	Identify the ingredients and properties of fresh and hardened concrete.
	CO5	To interpret and design concrete mix for various grades for various exposure conditions.
	CO6	To study the new technology for manufacturing, testing and quality of concrete.
CEC405 Fluid Mechanics - II	CO1	Analyze flow through pipes, various losses through pipes, pipe network and power transmission through nozzle
	CO2	Explain the concept of Laminar flow and velocity distribution through parallel plates and pipes
	CO3	Explain the concept of Turbulent flow and velocity distribution in pipes
	CO4	Describe boundary layer concept , boundary layer separation and flow around submerged bodies
	CO5	Apply Moment of Momentum Principle

				Explain the importance of dimensionless numbers, dimensional analysis and similarity behavior of model and prototype
			CO6	

ELECTRONICS & TELECOMMUNICATION ENGINEERING

SECOND YEAR / THIRD SEMESTER	ECC301	Applied Mathematics-III	CO1	Demonstrate the basic knowledge of Laplace Transform. Fourier series ,Complex Variables, Vector Algebra and Bessel's Function.
			CO2	Identify the Analytic Function, Harmonic Function, Orthogonal Trajectories and to apply Bilinear Transformation and Conformal Mappings.
			CO3	Demonstrate an ability to identify and model the problems of field of ENTC using Laplace Transform. Fourier series ,Complex Variables, Vector Algebra and Bessel's Function.
			CO4	Demonstrate and apply the concept of Laplace Transform. Fourier series ,Complex Analysis, vector calculus and Bessel's functions to the problems arising in ENTC Engg. formulation.
	ECC302	Electronic Devices and Circuits I	CO1	Understand the current voltage characteristics of semiconductor devices,
			CO2	Analyze dc circuits and relate ac models of semiconductor devices with their physical operation.
			CO3	Design and analyze of electronic circuits.
			CO4	Evaluate frequency response to understand behaviour of Electronics circuits.
	ECC303	Digital System Design	CO1	Students should be able to describe and solve various Number system and Codes
			CO2	Student should able to Analyse, Transform and Minimize Combinational and Sequential Circuit.

		CO3	Students should be able to Explain and Classify the Memory.
		CO4	Students should be able to Describe and Understant the Programmable Logic Devices.
		CO5	Students should be able to Write VHDL code for Combinational and Sequential circuit.
		CO6	Students should be able to communicate Digital Electronics effectively both verbally and in writing.
ECC304	Circuit Theory and Networks	CO1	Apply their knowledge in analysing Circuits by using network theorems.
		CO2	Apply the time and frequency method of analysis.
		CO3	Find the various parameters of two port network
		CO4	Apply network topology for analyzing the circuit
		CO5	Synthesize the network using passive elements.
ECC305	Electronic Instrumentation and Control	CO1	Students will be able to explain principle of operation for various sensors.
		CO2	Students will be able to describe functional blocks of data acquisition system.
		CO3	Students will be able to find transfer functions for given system.
		CO4	Students will be able to calculate time domain and frequency domain parameter for given system
		CO5	Students will be able to predict stability of given system using appropriate criteria.
ECL301	Electronic Devices and Circuits I Laboratory	CO1	An ability to verify the working of different diodes, transistors, CRO probes and measuring instruments. Identifying the procedure of doing the experiment

			CO2	An ability to design the circuits with basic semiconductor devices (active & passive elements), measuring instruments & power supplies that serves many practical purposes
			CO3	An ability to construct, analyze and troubleshoot the designed circuits
	ECL302	Digital System Design Laboratory	CO1	Students should be able to describe and solve various Number system and Codes
			CO2	.Student should able to Analyse, Transform and Minimize Combinational and Sequential Circuit.
			CO3	Students should be able to Explain and Classify the Memory.
			CO4	Students should be able to Describe and Understant the Programmable Logic Devices.
			CO5	Students should be able to Write VHDL code for Combinational and Sequential circuit.
			CO 6	Students should be able to communicate Digital Electronics effectively both verbally and in writing.
	ECL303	OOP using JAVA Laboratory	CO1	Students will be able to code a program using JAVA constructs.
			CO2	Students will be able to understand fundamental features of an object oriented language: object classes and interfaces, exceptions and libraries of object collections.
			CO3	Students will be able to develop a program that efficiently implements the algorithm for given tasks.
SECOND YEAR / FORTH SEMESTER	ECC401	Applied Mathematics-IV	CO1	Demonstrate basic knowledge of Calculus of variation, Vector Spaces, Matrix Theory, Random Variables, Probability Distributions, Correlation and Complex Integration.

			CO2	Demonstrate an ability to identify and Model the problems in the field of Electronics and Telecommunication and solve it.
			CO3	Apply the application of Mathematics in Telecommunication Engineering.
	ECC402	Electronic Devices and Circuits II	CO1	Design and analyse the basic operations of MOSFET.
			CO2	Know about the multistage amplifier using BJT and FET in various configuration to determine frequency response and concept of voltage gain.
			CO3	Know about different power amplifier circuits, their design and use in electronics and communication circuits.
			CO4	Know the concept of feedback amplifier and their characteristics.
			CO5	Design the different oscillator circuits for various frequencies.
	ECC403	Linear Integrated Circuits	CO1	Understand the fundamentals and areas of applications for the integrated circuits.
			CO2	Analyze important types of integrated circuits.
			CO3	Demonstrate the ability to design practical circuits that perform the desired operations
			CO4	Understand the differences between theoretical, practical & simulated results in integrated circuits.
	ECC404	Signals & Systems	CO1	Understand about various tpes of signals and systems, classif them, analyze them and perform various operations on them.
			CO2	Understand ues of transforms in analsis of signals and systems in continuous and discrete time domain

			CO3	Evaluate the time and frequency response of continuous and discrete time systems which is useful in understanding behaviour of electronics circuit and communication systems.
	ECC405	Principles of Communication Engineering	CO1	Use different modulation and demodulation techniques used in analog communication
			CO2	Identify and solve basic communication problems
			CO3	Analyze transmitter and receiver circuits
			CO4	Compare and contrast design issues, advantages, disadvantages and limitations of analog communication systems
	ECL401	Electronic Devices and Circuits II Laboratory	CO1	The students will be able to explain the plot of characteristics of semiconductor devices and various electronics circuits like oscillators, amplifiers, etc. as a group & individual.
			CO2	The students will be able to build the electronic circuit on breadboard and Multisim or Pspice, examine and show its working as a group & individual
	ECL402	Linear Integrated Circuits Laboratory	CO1	Connect and analyse important types of integrated circuits
			CO2	Implement the appropriate integrated circuit modules to build a given application
	ECL404	Principles of Communication Engineering Laboratory	CO1	Use different modulation and demodulation techniques used in analog communication
			CO2	Analyze transmitter and receiver circuits

CHEMICAL ENGINEERING

Gharda Institute of Technology

SECOND YEAR / THIRD SEMESTER	CHC301	Engineering Mathematics-III	CO1	Demonstrate & Apply the concepts of Laplace & Inverse Laplace Transform to evaluate definite integrals, Fourier series to expand the periodic functions.
			CO2	Demonstrate & Apply the concepts of Analytic function to find orthogonal trajectories, harmonic conjugate, the concepts of correlation & regressions, Bayes theorem & various probability distributions in the real life problems.
			CO3	Analyze and interpret the problems arising in engineering formulation using Laplace & Inverse Laplace Transform, Fourier series, Complex Variables, Correlation & Regression, Various probability distributions.
			CO4	Express graphically, mathematically functions of one domain into another domain using Laplace & Inverse Laplace Transform, periodic functions into sinusoidal components, statistical data using regression methods, various distribution into Moment generating function.
	CHC302	Industrial and Engineering Chemistry	CO1	Understand the different theories of chemical bonding, organometallic chemistry and reactive intermediate.
			CO2	Apply knowledge of dyes, fertilizers, analytical techniques of separation, identification and quality of fertilizers.
			CO3	Describe the reaction mechanisms, states of molecules, various types of dyes and reaction pathway in biological process.

			CO4	Justify stability of coordination compounds, kinetics and energy of reactions and importance of organometallic compounds in biological process
			CO5	Express role of biomolecules, elemental constituents in fertilizers, and exchangers in industries.
			CO6	Apply concepts of electrochemistry and its applications quantitatively.
	CHC303	Fluid Flow Operations (FFO)	CO1	Acquire basic concepts and pressure measurement methods.
			CO2	Learn kinematics of flow, rheological behavior of fluid and boundary layer conditions.
			CO3	Learn Bernoulli's equation and apply it in practical applications of various problems in Chemical Engineering.
			CO4	Learn flow equations and evaluate the losses in incompressible flow.
			CO5	Learn the behavior of compressible fluids and Stokes Law and also able to apply these concepts for estimation of stagnation properties.
			CO6	Gain the knowledge of various pumps, choice of pumps, valves and agitators and would be able to calculate power requirement for pumps as well as for agitators.
	CHC304	Chemical Engineering Thermodynamics I	CO1	To apply the first law of thermodynamics to chemical engineering systems.
			CO2	To apply the second law of thermodynamics to chemical engineering systems

Gharda Institute of Technology

			CO3	To predict the P-V-T behavior of ideal gases and real gases
			CO4	To explain various thermodynamic concepts such as Entropy, Exergy and Fugacity
			CO5	To perform calculations involving the applications of the laws of thermodynamics to flow processes
			CO6	To demonstrate the use of thermodynamic charts and diagrams.
	CHC305	Process Calculations	CO1	Identify the various systems of units and conversion and apply principles of basic chemical calculations
			CO2	Apply the material balance for various unit operations for both steady and unsteady state operations.
			CO3	Compute the material balance of various unit processes
			CO4	Evaluate recycle, bypass and purge operations and its streams
			CO5	Perform energy balance calculations over various processes with and without chemical reactions
			CO6	Assess the material balance and energy load of a binary distillation column.
	CHL301	Industrial and Engineering Chemistry Lab	CO1	Prepare standard solutions, check their accuracy and present results in statistical format to calculate standard deviation
			CO2	Perform titrations and determine contents of solution quantitatively.
			CO3	Apply knowledge of instrumental analysis like Conductometry and Potentiometry.
			CO4	Learn methods of estimation of organic compounds quantitatively.

			CO5	Carry out gravimetric analysis systematically with proper understanding.
			CO6	Carry out synthesis of chemicals in laboratory.
CHL302		Fluid Flow Operation Lab	CO1	Determine viscosity by stokes law.
			CO2	Distinguish different flow patterns and calculations involving Reynolds number.
			CO3	Find coefficient of discharge for various flow measuring devices.
			CO4	Evaluate minor losses and frictional losses for various pipe fittings and network.
			CO5	Calculate power required and efficiency for various pumps.
			CO6	Find power requirement for various impellers in agitated vessel.
CHL303		Basic Chemical Engineering Lab	CO1	To Apply basic principles of chemistry and chemical engineering to solve and analyze complex industrial problems.
			CO2	To Apply mathematical skills to perform calculations on data obtained and use required formulas to do the same
			CO3	Evaluate sampling methods, required sampling size and reduce measurement errors for accurate experimental design
			CO4	To Evaluate experimental data by different data analysis methods on PC using MS Excelfor investigating complex problems
			CO5	To Analyze and interpret the results obtained from experiments

			CO6	Design new laboratory experiments to study industrial problems which will benefit society and environment by following strict ethical standards
		Skilled Based Lab Chemical Tech	CO1	To provide students an insight of different chemical processes and their engineering problems.
			CO2	To enable the students to understand the development of a process from its chemistry.
			CO3	To equip students to draw and illustrate process flow diagrams.
			CO4	To develop laboratory procedures for the preparation of industrially important chemicals and products.
			CO5	To enable students to be skilled in the practical aspects of synthesis of chemicals.
	CHL304		CO6	To present the outcomes of laboratory experiments in the form of reports.
	CHM301	Mini Project 1A	CO1	To acquaint with the process of identifying the needs and converting it into the problem.
			CO2	To familiarize the process of solving the problem in a group.
			CO3	To acquaint with the process of applying basic engineering fundamentals to attempt solutions to the problems.
			CO4	To inculcate the process of self-learning and research.

Gharda Institute of Technology

	CHC401	Engineering Mathematics-IV	CO1	Demonstrate and Apply the Vector Calculus to find normal to the surface, directional derivative, Scalar potential, line & surface integrals, Cauchy's theorems to evaluate various contour integrals, concepts of correlation & regressions
SECOND YEAR / 4th SEMESTER			CO2	Demonstrate and Apply Apply the concepts of probability distributions & sampling techniques in the real life problems.
			CO3	Analyze and interpret the problems arising in engineering formulation using Correlation & Regression, Various probability distributions, Vector calculus, sampling techniques.
			CO4	Express graphically, mathematically the functions in terms of Laurent's & Taylor's series, statistical data using regression methods, real life problems using sampling techniques.
	CHC402	Industrial and Engineering Chemistry II	CO1	Understand the theories of aqueous, non-aqueous solutions, surfactants, and colloids
			CO2	Differentiate between aromatic and non-aromatic compounds.
			CO3	Apply different spectroscopic methods and thermal methods for the detection of compounds.
			CO4	Analyse interpretations of spectral data and analytical techniques.
			CO5	Understand the reaction mechanism, its applications and synthesis of organic molecules.
			CO6	Express catalytic reactions and its applications in industry.
	CHC403	Numerical Method in Chemical Engineering	CO1	Solve linear algebraic equations.
			CO2	Solve nonlinear algebraic equations.

			CO3	Solve using Curve fitting
			CO4	solve Ordinary Differential equations
			CO5	Solve Partial Differential equations
			CO6	solve Chemical engineering problems with numerical analysis techniques.
CHC404		Solid Fluid Mechanical Operations (SFMO)	CO1	Familiarize particle size distribution.
			CO2	Learn size reduction principles
			CO3	Understand fluidization and filtration
			CO4	To have the knowledge of solid-fluid separation
			CO5	Understand storage and handling of solids
			CO6	Understand solid fluid mixing
CHC405		Chemical Engineering Thermodynamics II	CO1	Evaluate the thermodynamic properties of ideal and non-ideal solutions and mixtures.
			CO2	Perform calculations related to solution thermodynamics.
			CO3	Analyze and solve the problems of phase equilibria and vapour-liquid equilibria.
			CO4	Apply various methods for estimation of thermodynamic properties.
			CO5	Analyze and solve the problems of chemical reaction equilibria.
			CO6	Describe various types of refrigeration cycles and evaluate their performance.
CHL401		Industrial and Engineering Chemistry II Lab	CO1	Determine dissociation constant of dibasic acid, strength of solution and quantity of solute pH metrically
			CO2	Perform the titration and find the content in terms of quantity
			CO3	Detect alkali metal ions spectrophtometrically

			CO4	Identify, separate and detect ions present in solvent chromatographically
			CO5	Identify the compound by interpreting the spectral data received from optical method
			CO6	Synthesize chemical compounds in laboratory
	CHL402	Numerical Method in Chemical Engineering Lab	CO1	Solve linear algebraic equations.
			CO2	Solve nonlinear algebraic equations.
			CO3	Solve using Curve fitting
			CO4	solve Ordinary Differential equations
	CHL403	Solid Fluid Mechanical Operation Lab	CO1	Understand the importance of various mechanical operations used in process industry
			CO2	Apply principles of basic sciences and chemical engineering for designing various size reduction and separation equipment.
			CO3	Understand particulate solid characterization, storage and transportation of solids.
			CO4	Familiarize primary and secondary crushers.
			CO5	Acquire knowledge of mixing operation.
			CO6	Understand filtration and sedimentation operation.
	CHL404	Skilled Based Lab: Design Calculation of Auxiliary Plant Equipment	CO1	Students should be able to understand the various units and their conversion factors.
			CO2	They should be able to calculate basic properties of various substances.
			CO3	They should be able to do calculations for designing the pressure vessels subjected to internal and external pressure and properties related to storage tanks of various geometries.
			CO4	They should be able to do calculations to determine sizing of the pipelines and valves.

Gharda Institute of Technology

			CO5	They should be able to calculate power requirement in agitation.
			CO6	They should be able to perform various calculations from basic principles of chemical engineering.
	CHM401	Mini Project 1BB	CO1	To acquaint with the process of identifying the needs and converting it into the problem.
			CO2	To familiarize the process of solving the problem in a group.
			CO3	To acquaint with the process of applying basic engineering fundamentals to attempt solutions to the problems.
			CO4	To inculcate the process of self-learning and research.

MECHANICAL ENGINEERING

SECOND YEAR SEMESTER-3	MEC301	ENGINEERING MATHEMATICS- III	CO1	– Demonstrate and Apply the concepts of Laplace & Inverse Laplace Transform to evaluate definite integrals, Fourier series to expand the periodic functions.
			CO2	Demonstrate and Apply the concepts of Analytic function to find orthogonal trajectories, harmonic conjugate, Matrix Algebra to calculate the eigenvalues, eigenvectors, function of square matrix, inverse of matrix and Variable separable & Numerical methods to solve Heat & wave equations
			CO3	Analyze and interpret the problems arising in engineering formulation using Laplace & Inverse Laplace Transform, Fourier series, Complex Variables, Matrices and Partial Differential Equations.

			CO4	
				Express graphically, mathematically functions of one domain into another domain using Laplace & Inverse Laplace Transform, periodic functions into sinusoidal components, matrix into diagonal form, function of matrix and wave & heat equations into sinusoidal components.
			CO5	
	MEC302	STRENGTH OF MATERIAL	CO1	Demonstrate fundamental knowledge about various types of loading and stresses induced
			CO2	Draw the SFD and BMD for different types of loads and support conditions
			CO3	Analyse the bending and shear stresses induced in beam
			CO4	Analyse the deflection in beams and stresses in shaft
				Analyse the stresses and deflection in beams and Estimate the strain energy in mechanical elements.
				Analyse buckling phenomenon in columns
	MEC303	PRODUCTION PROCESSES	CO1	Demonstrate the casting process
			CO2	Illustrate principles of forming processes
			CO3	Demonstrate applications of various types of welding processes
			CO4	Differentiate chip forming processes such as turning, milling, drilling, etc
			CO5	Illustrate the concept of producing polymer components.
			CO6	Understand the non-traditional manufacturing processes along with manufacturing technologies enabling Industry 4.0

Gharda Institute of Technology

	MEC304	MATERIALS AND METALLURGY	CO1	Identify the various classes of materials and comprehend their properties
			CO2	Draw phase diagram and apply its concepts to engineering applications
			CO3	Apply particular heat treatment for required property development
			CO4	Identify the probable mode of failure in materials and suggest measures to prevent them
			CO5	Choose or develop new materials for better performance
			CO6	Decide an appropriate method to evaluate different components in service
	MEC305	THERMODYNAMICS	CO1	Understand basic concepts of thermodynamics including basic definitions & units, laws of thermodynamic, properties of steam, property relations, power cycles and compressible fluid flow
			CO2	Differentiate between the thermodynamic properties like work and energy, enthalpy and entropy, gas and vapor power cycles, etc.
			CO3	Analyze various power cycles and energy equations, etc
			CO4	Apply thermodynamics laws & concepts to solve the real system problems, derivations, etc.
SECOND YEAR SEMESTER-4	MEC404	CAD/CAM	CO1	Identify suitable computer graphics techniques for 3D modeling.
			CO2	Transform, manipulate objects & store and manage data.

			CO3	Develop 3D model using various types of available biomedical data.
			CO4	Create the CAM Toolpath for specific given operations.
			CO5	Build and create data for 3D printing of any given object using rapid prototyping and tooling processes.
			CO6	Illustrate understanding of various cost effective alternatives for manufacturing products.
	MESBL401	CNC and 3-D Printing	CO1	Develop and execute part programing for any given specific operation.
			CO2	Build any given object using various CNC operations
			CO3	Demonstrate CAM Tool path and prepare NC- G code
			CO4	Develop 3D model using available biomedical data
			CO5	Build any given real life object using 3D printing process
			CO6	Convert 2D images into 3D model
	MEC401	Engineering Mathematics-IV	CO1	Demonstrate and Apply the Vector Calculus to find normal to the surface, directional derivative, Scalar potential, line & surface integrals, Cauchy's theorems to evaluate various contour integrals, concepts of correlation & regressions.
			CO2	Demonstrate and Apply Apply the concepts of probability distributions & sampling techniques in the real life problems.

			CO3	Analyze and interpret the problems arising in engineering formulation using Correlation & Regression, Various probability distributions, Vector calculus, sampling techniques.
			CO4	Express graphically, mathematically the functions in terms of Laurent's & Taylor's series, statistical data using regression methods, real life problems using sampling techniques.
	MEC403	KOM	CO1	Identify various components of mechanisms
			CO2	Develop mechanisms to provide specific motion
			CO3	Draw velocity and acceleration diagrams of various mechanisms
			CO4	Choose a cam profile for the specific follower motion
			CO5	Predict condition for maximum power transmission in the case of a belt drive
			CO6	Illustrate requirements for an interference-free gear pair
	MEC402	Fluid Mechanics	CO1	Understand the properties of fluid, fluid statics, kinematics, dynamics and different types of fluid flow
			CO2	Derive the basic equations for compressible and incompressible flow by making appropriate assumptions
			CO3	Solve the different problems of compressible, incompressible fluid flow through closed and open conduit

LIST OF COURSE OUTCOMES REV-2016

COMPUTER ENGINEERING

Gharda Institute of Technology

THIRD YEAR / FIFTH SEMESTER	CSC501	Microprocessor	CO1	Describe core concepts of 8086 microprocessor
			CO2	Interpret the instructions of 8086 and write assembly and Mixed language programs.
			CO3	Design 8086 based system using memory and peripheral chips.
			CO4	Appraise the architecture of advanced processors and understand hyperthreading technology
	CSC502	Database Management System	CO1	Understand the fundamentals of a database systems
			CO2	Design and draw ER and EER diagram for the real life problem.
			CO3	Convert conceptual model to relational model and formulate relational algebra queries.
			CO4	Design and querying database using SQL.
			CO5	Analyze and apply concepts of normalization to relational database design.
			CO6	Understand the concept of transaction, concurrency and recovery.
	CSC503	Computer Network	CO1	Demonstrate the concepts of data communication at physical layer and compare ISO - OSI model with TCP/IP model.
			CO2	Explore different design issues at data link layer.
			CO3	Design the network using IP addressing and sub netting / supernetting schemes.
			CO4	Analyze transport layer protocols and congestion control algorithms.

			CO5	Explore protocols at application layer
	CSC504	Theory of Computer Science	CO1	Describe the Power and Limitations of theoretical models of Computation
			CO2	Design DFA,NFA,Regular Expression,CFG,PDA and TM to recognize the languages.
			CO3	Design TM to recognize the languages.
	CSDLO5011	Multimedia System	CO1	To understand & identify basics of multimedia, multimedia system architecture and different multimedia components.
			CO2	To explain file formats for different multimedia components.
			CO3	To analyze the different compression algorithms.
			CO4	To describe various multimedia communication techniques.
			CO5	To apply different security techniques in multimedia environment.
	CSL501	Microprocessor Lab	CO1	Describe core concepts of 8086 microprocessor
			CO2	Interpret the instructions of 8086 and write assembly and Mixed language programs.
			CO3	Design 8086 based system using memory and peripheral chips.
			CO4	Appraise the architecture of advanced processors and understand hyperthreading technology
	CSL502	Computer Network Lab	CO1	Design and setup networking environment in Linux.

			CO2	Use Network tools and simulators such as NS2, Wireshark etc. to explore networking algorithms and protocols
			CO3	Implement programs using core programming APIs for understanding networking concepts.
CSL503	Database & Info. System Lab		CO1	Design and draw ER and EER diagram for the real life problem with software tool.
			CO2	Create and update database and tables with different DDL and DML statements
			CO3	Apply /Add integrity constraints and able to provide security to data
			CO4	Implement and execute Complex queries and Apply triggers and procedures for specific module/task
			CO5	Handle concurrent transactions and able to access data through front end (using JDBC ODBC connectivity.)
CSL504	Web Design Lab		CO1	Understand the concept of web technology and internet programming
			CO2	Design static and dynamic web pages.
			CO3	Develop dynamic web application using database connectivity.
			CO4	Understand the basics of XML, DTD and XSL and develop web pages using XML / XSLT
CSL505	Business Comm. & Ethics		CO1	Design a technical document using precise language, suitable vocabulary and apt style.

			CO2	Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships
			CO3	Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities
			CO4	Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP
			CO5	Deliver formal presentations effectively implementing the verbal and non-verbal skills
THIRD YEAR / SIXTH SEMESTER	CSC601	Software Engineering	CO1	Identify requirements & assess the process models.
			CO2	Plan, schedule and track the progress of the projects.
			CO3	Design the software projects.
			CO4	Do testing of software project.
			CO5	Identify risks, manage the change to assure quality in software projects.
	CSC602	System Programming & Complier Construction	CO1	Students should be able to describe basic concepts and designing of system software
			CO2	Students should be able to write/implement the compiler phases, Assembler, Macro processor

			CO3	Students should be able to demonstrate the working of parsers, Assembler, Macro processor
			CO4	Course has stimulated student's interest in the field of System Programming & Compiler Construction.
	CSC603	Data Warehousing &Mining	CO1	Understand data warehouse fundamentals and design data warehouse with dimensional modelling and apply OLAP operations
			CO2	Understand data mining principles and perform Data preprocessing and Visualization.
			CO3	Identify appropriate data mining algorithms to solve real world problems.
			CO4	Compare and evaluate different data mining techniques like classification, prediction, clustering and association rule mining
			CO5	Describe complex information and social networks with respect to web mining
	CSC604	Cryptography & System Security	CO1	Understand system security goals and concepts, classical encryption techniques, acquire fundamental knowledge on the concepts of modular arithmetic and number theory and compare and apply different encryption and decryption techniques to solve problems related to confidentiality and authentication

			CO2	Apply the knowledge of cryptographic checksums, different digital signature algorithms to achieve authentication and evaluate the performance of different message digest algorithms for verifying the integrity of varying message sizes.
			CO3	Understand network security basics, analyze different attacks on networks, evaluate the performance of firewalls and security protocols like SSL, IPSec, and PGP and apply system security concept to recognize malicious code.
	CSDLO6023	Enterprise Resource Planning	CO1	To understand the basic structure of ERP.
			CO2	To identify implementation strategy used for ERP.
			CO3	To apply design principles for various business modules in ERP.
			CO4	To apply different emerging technologies for implementation of ERP.
			CO5	To analyze security issues in ERP & to acquire ERP concepts for real world applications.
	CSL601	Software Engineering Lab	CO1	Identify requirements & assess the process models.
			CO2	Plan, schedule and track the progress of the projects.
			CO3	Design the software projects.
			CO4	Do testing of software project.

			CO5	Identify risks, manage the change to assure quality in software projects.
	CSL602	System software Lab	CO1	Students should be able to describe basic concepts and designing of system software
			CO2	Students should be able to implement the compiler phases, Assembler, Macro processor
	CSL603	Data Warehousing & Mining Lab	CO1	Design data warehouse and perform various OLAP operations
			CO2	Implement classification, prediction, clustering and association rule mining algorithms.
			CO3	Demonstrate classifications, prediction, clustering and association rule mining algorithms on a given set of data sample using data mining tools
			CO4	Implement spatial and web mining algorithms.
	CSL604	System Security Lab	CO1	To be able to apply the knowledge of symmetric cryptography to implement simple ciphers.
			CO2	To be able to analyze and implement public key algorithms like RSA and El Gamal.
			CO3	To analyze and evaluate performance of hashing algorithms.
			CO4	To explore the different network reconnaissance tools to gather information about networks.

			CO5	To explore and use tools like sniffers, port scanners and other related tools for analysing packets in a network.
	CSP605	Mini-Project	CO1	Acquire practical knowledge within the chosen area of technology for project development.
			CO2	Identify, analyze, formulate and handle programming projects with a comprehensive and systematic approach
			CO3	Contribute as an individual or in a team in development of technical projects
			CO4	Develop effective communication skills for presentation of project related activities
FINAL YEAR / SEVENTH SEMESTER	CSC701	Digital Signal & Image Processing	CO1	Apply the concept of DT Signal and DT Systems to classify and analyze discrete signals
			CO2	Implement Digital Signal Transform techniques DFT and FFT
			CO3	Use the enhancement techniques for digital Image Processing
			CO4	Apply various filtering concepts on digital image to make it smooth or sharp as per the requirement of application
	CSC702	Mobile Communication & Computing	CO1	1 To identify basic concepts and principles in mobile communication and computing, cellular architecture.

			CO2	2 To describe the components and functioning of mobile networking.
			CO3	3 To classify variety of security techniques in mobile network.
			CO4	4 To apply the concepts of WLAN for local as well as remote applications.
			CO5	5 To describe and apply the concepts of mobility management
			CO6	6 To describe Long Term Evolution (LTE) architecture and its interfaces.
	CSC703	Artificial Intelligence & Soft Computing	CO1	Identify the various characteristics of Artificial Intelligence and Soft Computing techniques.
			CO2	Choose an appropriate problem solving method for an agent to find a sequence of actions to reach the goal state.
			CO3	Analyse the strength and weakness of AI approaches to knowledge representation, reasoning and planning.
			CO4	Construct supervised and unsupervised ANN for real world applications.
			CO5	Design fuzzy controller system.
			CO6	Apply Hybrid approach for expert system design.

	CSDLO7032	Big Data & Analytics	CO1	Understand & describes the key issues in big data management and its associated applications for business decisions and strategy.
			CO2	Develop problem solving and critical thinking skills in fundamental enabling techniques like Hadoop, Mapreduce and NoSQL in big data analytics.
			CO3	Collect, manage, store, query and analyze various forms of Big Data.
			CO4	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
	ILO7016	Cyber Security and Laws	CO1	Understand the concept of cybercrime and its effect on outside world
			CO2	Interpret and apply IT law in various legal issues
			CO3	Distinguish different aspects of cyber law
			CO4	Apply Information Security Standards compliance during software design and development
	CSL701	Digital Signal & Image Processing Lab	CO1	Apply the concept of DT Signal and DT Systems to classify and analyze discrete signals
			CO2	Implement Digital Signal Transform techniques DFT and FFT
			CO3	Use the enhancement techniques for digital Image Processing

			CO4	Apply various filtering concepts on digital image to make it smooth or sharp as per the requirement of application
	CSL702	Mobile App. Development. Tech. Lab	CO1	1. To develop and demonstrate mobile applications using various tools
			CO2	2. Students will articulate the knowledge of GSM, CDMA & Bluetooth technologies and demonstrate it.
			CO3	3. Students will able to carry out simulation of frequency reuse, hidden terminal problem
			CO4	4. To develop security algorithms for mobile communication network
			CO5	5. To demonstrate simulation and compare the performance of Wireless LAN
			CO6	6. To implement and demonstrate mobile node discovery and route maintains.
	CSL703	Artificial Intelligence & Soft Computing Lab	CO1	To realize the basic techniques to build intelligent systems
			CO2	To create knowledge base and apply appropriate search techniques used in problem solving.

			CO3	Apply the supervised/unsupervised learning algorithm.
			CO4	Designfuzzy controller system.
	CSL704	Computational Lab-I	CO1	Understand & describes the key issues in big data management and its associated applications for business decisions and strategy.
			CO2	Collect, manage, store, query and analyze various forms of Big Data.
			CO3	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
	CSL705	Major Project-I	CO1	1) To promote students to develop further skills and knowledge gained during program.
			CO2	2) To make them able to analyse a specific problem or issue and find the appropriate solution for them
			CO3	3) To demonstrate proficiency in the design of a research project, application of appropriate research methods
			CO4	4) To collect and analyse data and presentation of results
FINAL YEAR / EIGHTH SEMESTER	CSC801	Human Machine Interaction	CO1	Study human characteristics to provide user friendly human machine interaction through easy user interface.
			CO2	Apply interactive design process in real world applications

			CO3	Design application for social and technical task
	CSC802	Distributed Computing	CO1	Demonstrate knowledge of the basic concepts related to distributed system technologies and illustrate the middleware technologies that support distributed applications such as RPC, RMI and Object based middleware.
			CO2	Analyze and Demonstrate the various techniques used for clock synchronization, mutual exclusion and the concepts of Resource, Process management, synchronization algorithms.
			CO3	Apply and demonstrate the concepts of Consistency, replication Management and the knowledge of Distributed File System to analyze various file systems like NFS, AFS and the experience in building large-scale distributed applications.
	DLO8012	Natural Language Processing	CO1	Have a broad understanding of the field of natural language processing.
			CO2	Have a sense of the capabilities and limitations of current natural language technologies,
			CO3	Be able to model linguistic phenomena with formal grammars.
			CO4	Be able to Design, implement and test algorithms for NLP problems

			CO5	Understand the mathematical and linguistic foundations underlying approaches to the various areas in NLP
			CO6	Be able to apply NLP techniques to design real world NLP applications such as machine translation, text categorization, text summarization, information extraction...etc.
	ILO8024	Human Resource Managment	CO1	
			CO2	
			CO3	
			CO4	
			CO5	
	CSL801	Human Machine Interaction Lab	CO1	Study human characteristics to provide user friendly human machine interaction through easy user interface.
			CO2	Apply interactive design process in real world applications
			CO3	Design application for social and technical task
	CSL802	Distributed Computing Lab	CO1	Develop, test and debug RPC/RMI based client-server programs.
			CO2	Implement the main underlying components of distributed systems (such as IPC, name resolution, file systems etc.)
			CO3	Implement various techniques of synchronization.
			CO4	Design and implement application programs on distributed systems

CSL803	Cloud Computing Lab	CO1	Adapt different types of virtualization and increase resource utilization.
		CO2	Build a private cloud using open source technologies.
		CO3	Analyze security issues on cloud.
		CO4	Develop real world web applications and deploy on commercial cloud.
		CO5	Demonstrate various service models.
CSL804	Computational Lab-II	CO1	Acquire practical knowledge within the chosen area of technology for project development
		CO2	Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
CSL805	Major Project-II	CO1	1) To promote students to develop further skills and knowledge gained during program.
		CO2	2) to meet the milestone s formed in the overall project plan decided in Project - I.
		CO3	3) To demonstrate proficiency in the design of a research project, application of appropriate research methods
		CO4	4) To collect and analyse data and presentation of results
		CO5	5) To culminate the production of a thesis by each individual student

CIVIL ENGINEERING

Gharda Institute of Technology

THIRD YEAR / 5th SEMESTER/ C Scheme/ R-2016	CEC501 Structural Analysis-II	CO1	Understand the behavior of various statically indeterminate structures subjected to static loads and variation in temperature.
		CO2	Analyze the structures using displacement parameters to find out the internal forces such as axial force, shear force, bending moment, twisting moments, etc. for beams, 2D portal frames with various loads and boundary conditions, which becomes the basis for structural design.
		CO3	Contrast between the concept of force and displacement methods of analysis of indeterminate structures. Also, the elastic curve in beams and frames under the action of loads.
		CO4	Understand the concept of plastic hinge, plastic moment carrying capacity, shape factor and collapse load for single and multiple span beams.
		CO5	Find out the approximate dimensions of beams and columns using the approximate method for giving the input in design software. The knowledge gained in this subject shall also be useful for application in the structural design in later years and also useful in the civil engineering field for the analysis purpose.

		CO6	Demonstrate the ability to extend the knowledge gained in this subject for their higher years UG Programme subjects such as Advanced Structural Analysis and Advanced Structural Mechanics in which they will be dealing with the indeterminate structures.
	CEC502 Geotechnical Engineering-I	CO1	Understand the soil types, index and engineering properties and relationship between various unit weights & other parameters.
		CO2	Classify the soil with a view towards assessing the suitability of a given soil for use; either to use if to support a structure (e.g. embankment) or to construct a structure therein (e.g. foundation)
		CO3	Understand the use of geosynthetics in soil to improve soil properties.
		CO4	Evaluate the compaction characteristics in laboratory & field and hence interpret the results with compaction specifications.
		CO5	Interpret soil boring data for foundation design.
		CO6	Conduct laboratory experiments to collect, analyze, interpret and present the data
	CEC503 Applied Hydraulics	CO1	Apply the concepts of fluid dynamics to solve pipe bend and sprinkler problems.
		CO2	Analyze dimensional problems and explain model laws.

		CO3	Explain the working and functions of Francis, Kaplan and Pelton wheel turbines.
		CO4	Explain the basic concepts of open channel hydraulics and measure discharge through open channels.
		CO5	Identify the occurrence of hydraulic jump and its parameters
		CO6	Explain uniform flow, non-uniform flow and establish mathematical relationships.
	CEC504 Environmental Engineering-I	CO1	Understand the water supply system, its components and water demand by various consumers.
		CO2	Understand and analyze the quality of water and will be able to conduct the quality control test on samples.
		CO3	Understand the different processes in the water treatment facility.
		CO4	Design the different units of treatment for water treatment plants
		CO5	Understand the components of building water supply system, storage and rain water harvesting.
		CO6	Understand the problems of air and noise pollution. Besides, they will be prepared to contribute practical solutions to environmental problems in our society

	CEC505 Transportation Engineering-I	CO1	To get an insight of the development in all the fields of highway engineering and familiarized with different surveys required to be carried out for the implementation of the highway project; to understand the phase of engineering which deals with the planning and geometrics design of streets, highways and abutting land in the context of safe and convenient traffic operations thereon.
		CO2	To know the required properties of the different materials to be used in the construction of highways and other allied structures, to understand characterization of the materials and to evaluate their suitability; understand the principle of soil stabilization, utilization of geosynthetics in the construction of highway and allied structures
		CO3	To understand the classification of different types of pavements, factors to be considered in the design of pavements, approaches for designing the different types of pavements and can the flexible and rigid pavements be using IRC Specifications.

		CO4	To get an insight into the methods of construction of different types of pavements; along with the importance of highway drainage and various methods of providing the drainage; also, to understand the elements of bridge engineering.
		CO5	To illustrate different distresses in the pavements, evaluate the pavements in terms of its functional and structural adequacy and arrive upon the rehabilitation measures.
		CO6	To explain methods to strengthen the distressed pavements, low volume and low-cost road and also to understand the significance of the drainage in the field of highway engineering including different methods of providing the drainage in the highways.
	CE-DLO 5062 Department Level Optional Course-I: Advanced Concrete Technology	CO1	Know the various materials and properties in concrete
		CO2	Understand the Mix design by different methods.
		CO3	Understand the various properties of special concrete.
		CO4	Get a thorough knowledge of Fibre Reinforced Concrete.
		CO5	Know the different procedures for testing concrete.

		CO6	Understand the concept of durability of concrete.
THIRD YEAR / 6th SEMESTER/ C Scheme/ R-2016	CEC601 Geotechnical Engineering-II	CO1	Students will be able to evaluate the consolidation parameters for the soil.
		CO2	Students will be able to calculate the shear strength parameters for the soil.
		CO3	Students will be able to calculate the factors of safety of different types of slopes under various soil conditions, analyze the stability of slopes, calculate lateral earth pressures and analyse the stability of retaining walls.
		CO4	Students will be able to calculate bearing capacity of shallow foundations using theoretical and field methods, calculate load bearing capacity of individual as well as group of pile foundations and their settlement using theoretical and field methods
		CO5	Students will be able to explain conduits and calculate the load carried by the struts of a braced cut under various soil conditions.
		CO6	Students will be able to explain ground improvement techniques.
	CEC602 Design and Drawing of Steel Structures	CO1	Explain the Limit State Design philosophy as applied to steel structures.
		CO2	Predict the behavior and design members subjected to axial compression, tension and their connection.

		CO3	Predict the behavior and design members subjected to bending, shear and their connection
		CO4	Calculate loading for a truss and design the complete truss.
		CO5	Demonstrate ability to follow IS codes, design tables and aids in analysis and design steel structures.
		CO6	Analyze and design the commercial steel structures and prepare drawing with complete detailing.
	CEC603 Transportation Engineering-II	CO1	Understand the various systems of railway, airport, water transportation and the components of pway and its construction, yards, modernization of railway track
		CO2	Apply the concept of geometric design of railway track and railway traffic control.
		CO3	Understand airport planning, obstructions and orientation of runway.
		CO4	Apply the concept of geometric design of runway, taxiway, etc. and the knowledge of various signaling system for air traffic control.
		CO5	Understand the system of water transportation, types of breakwater, harbours and port facilities equipment
		CO6	Understand the basic idea about the bridge engineering.

	CO1	Explain wastewater collection systems in buildings and municipal areas and to determine the quantity of wastewater and storm water production. Also, gain the knowledge of the construction of new sewer line and importance of sewer appurtenances.
	CO2	Explain and analyze the characteristics of wastewater and design the primary treatment for wastewater
CE-C604 Environmental Engineering – II	CO3	Explain on-site treatment methods and solve Analyze and design wastewater treatment systems (ASP, Aerated lagoon and Oxidation ponds).
	CO4	Identify and apply proper treatment for reclamation and reuse of wastewater and disposal.
	CO5	Explain sludge characteristics and processing methods
	CO6	To provide knowledge of solid waste collection system, characteristics of solid waste and to identify hazardous waste. Study related to plastic waste management will be studied.
	CO1	Classify various types of irrigation projects
CEC605 Water Resources Engineering-I	CO2	Explain different irrigation methods and effective use of water resources
	CO3	Calculate the crop water requirements and irrigation requirement.

		CO4	Derive hydrographs and calculate runoff of a catchment area.
		CO5	Explain the steady state and unsteady state conditions of any aquifer and design water wells
		CO6	Estimate the capacity of a reservoir for different purposes.
	CE-DLO6061 Department Level Optional Course-II-Advanced Construction Equipment	CO1	Understand the use/applications of various conventional construction equipment and select the best out of them for a particular site requirement.
		CO2	Know modern methods/equipment used for underground as well as underwater tunnelling.
		CO3	Compare conventional and modern methods of formwork on the basis of productivity, reuse value, ease of erection and dismantling, flexibility offered and overall cost.
		CO4	Understand the techniques involved and the equipment required thereof for construction of various transporting facilities
		CO5	Gain knowledge about the setting up of different kinds of the power generating structures.
		CO6	Select proper equipment for construction of transporting facilities based on requirements.
LAST YEAR / 7th	CE-C 701 Quantity Survey, Estimation & Valuation	CO1	Apply the measurement systems to various civil engineering items of work

Gharda Institute of Technology

SEMESTER/ Rev 2016		CO2	Draft the specifications for various items of work & determine unit rates of items of works
		CO3	Estimate approximate cost of the structures by using various methods & prepare detailed estimates of various civil engineering structures by referring drawings.
		CO4	Assess the quantities of earthwork &construct mass haul diagrams.
		CO5	Draft tender notice &demonstrate the significance of the tender as well as contract process.
		CO6	Draft tender notice &demonstrate the significance of the tender as well as contract process.
	CE-C 702 Theory of Reinforced Concrete Structures	CO1	Understand the pros and cons of the WSM and LSM.
		CO2	Understand the various clauses specified in IS: 456-2000 for designing structural members with the safety and economy.
		CO3	Carry out analysis and design of various elements of the reinforced concrete structures such as beam, slab, column, footings using the concept of Limit state method.
		CO4	Understand and the use of readymade design curves from Special publications of Bureau of Indian standards.
	CE-C 703 Water Resources Engineering II	CO1	Design the section of gravity dams, earth and rockfill dams, arch dams and buttress dams.

	CO2	Design spillways and energy dissipaters.
	CO3	Apply silt theories to design irrigation canals.
	CO4	Explain various types of canals and its maintenance
	CO5	Explain different cross drainage works of a canal system
CE-DLO 7042 Department Level Elective: Solid Waste Management	CO1	Explain generation, storage, collection, transfer and transport, processing, recovery and disposal in the management of solid waste.
	CO2	Understand the characteristics of different types of solid waste and the factors affecting variation.
	CO3	Identify the methods of collection, storage and transportation of solid waste.
	CO4	Suggest suitable technical solutions for processing of wastes.
	CO5	Ability to plan waste minimization and disposal of municipal solid waste.
	CO6	Ensure the safe handling and treatment of Hazardous, Electronic and Biomedical waste.
CE-C ILOC7017 Institute Level Elective: Disaster Management and Mitigation Measures	CO1	Get to know natural as well as manmade disaster and their extent and possible effects on the economy.
	CO2	Plan of national importance structures based upon the previous history.

		CO3	Get acquainted with government policies, acts and various organizational structure associated with an emergency.
		CO4	
LAST YEAR / 8th SEMESTER/ Rev 2016	CE-C 801 Design and Drawing of Reinforced Concrete Structures	CO1	Design independently RCC structure by applying IS code provisions.
		CO2	Design staircase, water tank and retaining wall.
		CO3	Explain principles of PSC and calculate losses.
		CO4	Draw and explain the structural detailing.
		CO5	Explain response of structure during an earthquake and calculate design forces.
	CE-C 802 Construction Management	CO1	Understand & apply the knowledge of management functions like planning, scheduling, executing & controlling the construction projects.
		CO2	Prepare feasible project schedule by using various scheduling techniques.
		CO3	Gain knowledge of managing various resources &recommend best method of allocating the resources to the project.
		CO4	develop optimum relationship between time & cost for construction project
		CO5	Implement quality & safety measures on construction sites during execution of civil engineering projects.
		CO6	Understand the importance of labour legislation

Gharda Institute of Technology

	CE-C DLO8032 Department Level Elective: Industrial Waste Treatment	CO1	Understand the characteristics of industrial wastewater.
		CO2	Identify sampling method and analyze industrial waste.
		CO3	Design facilities for the processing and reclamation of industrial waste water.
		CO4	Explain on-site treatment methods and solve Analyze and design wastewater treatment systems. (floatation, vacuum filtration, centrifugation, filter press and membrane filters)
		CO5	Detailed on-site manufacturing processes and treatments of industrial waste water.
		CO6	Analyze proposed development project plans for possible environmental effects and to improve treated effluent quality to confirm standard prescribed by regulatory agencies.
	CE-C ILOC8021 Institute Level Elective: Project Management	CO1	Apply selection criteria and select an appropriate project from different options
		CO2	Write work break down structure for a project and develop a schedule based on it.
		CO3	Identify opportunities and threats to the project and decide an approach to deal with them strategically.
		CO4	Use Earned value technique and determine & predict status of the project.
		CO5	Capture lessons learned during project phases and document them for future reference

Gharda Institute of Technology

	CE-C ILOC8028 Institute level Elective : Environmental Management		CO1	Understand the concept of environmental management
			CO2	Understand ecosystem and interdependence, food chain etc.
			CO3	Understand and interpret environment related legislations

CHEMICAL ENGINEERING

THIRD YEAR / 5th SEMESTER/ C Scheme/ R-2016	CHC501	Computer programming and Numerical Methods	CO1	The students will be able to solve linear algebraic equations.
			CO2	The students will be able to solve non-linear algebraic equations.
			CO3	The students will be able to solve differential equations
			CO4	The students will be able to solve partial differential equations
	CHC502	Mass transfer Operations-I (MTO- I)	CO1	demonstrate the knowledge of mass transfer by applying principles of diffusion, mass transfer coefficients, and interphase mass transfer.
			CO2	Calculate Individual and overall mass transfer coefficient
			CO3	Understand the concept and operation of various types of gas-liquid contacts equipments

			CO4	Determine NTU, HTU, HETP and height of packed bed used for Absorption and Humidification operations
			CO5	Find time required for drying
			CO6	To study different types of dryers
	CHC503	Heat transfer Operations (HTO)	CO1	Understand laws and modes of Heat Transfer
			CO2	Design double pipe Heat Exchanger and Shell and Tube Heat Exchanger
			CO3	Familiar with Extended surface, Evaporators and Agitated vessels
	CHC504	Chemical Reaction Engineering-I (CRE I)	CO1	Students will be able to identify and analyze different types of homogeneous reactions
			CO2	Students will be able to apply the knowledge they have gained to develop kinetic models for different types of Homogeneous reactions
			CO3	Students will be able to find the model equation and use this model to design the reactors used for Homogeneous reactions
			CO4	Students will be able to understand the effect of temperature on reactor performance for adiabatic and non adiabatic operation and develop kinetic model to design the reactors for adiabatic and non-isothermal operations
	CHC505	Business Communication & Ethics	CO1	Recognize and demonstrate the knowledge of business Communication theory, basic official correspondence, job application and resume etc.

			CO2	Apply the communication theory knowledge to compare it with results obtained by performing practicals through group discussion and technical presentation individually and in groups and facing job interviews.
			CO3	Produce and present technical reports and business documentations by using modern medias.
	CHDC5014	Instrumentation (CHDE5014)	CO1	The student will be able to calculate the output of various measuring schemes
			CO2	The student will be able to select a DAQ card for any given application
			CO3	The student will be able to select the appropriate type of instrument for any application
			CO4	The student will be able to prepare a basic control scheme for process units
			CO5	The student will be able to write programs for a PLC.
	CHL501	Computer programming and Numerical Methods lab	CO1	The students will be able to solve linear algebraic equations.
			CO2	The students will be able to solve non-linear algebraic equations.
			CO3	The students will be able to solve differential equations

	CHL502	Chemical Engineering Lab IV (MTO-I)	CO1	.To understand the basic principles of mass transfer by molecular diffusion in gases, liquids and solids To study diffusion through solid
			CO2	To understand and determine mass transfer coefficients for various systems.
			CO3	To understand the working of various equipment used for contacting gas- liquid systems and to calculate NTU, HTU, Number of stages etc.
			CO4	To understand the unit operation of gas absorption and carry material and energy balance. Also students will carry out the calculations for tray and packed column
			CO5	To study and draw drying curve and calculate time of drying
			CO6	To study humidification and calculations for number of stages, HTU, NTU and HETP.
	CHL503	Chemical Engineering Lab V (HTO)	CO1	Understand laws and modes of Heat Transfer
			CO2	Design double pipe Heat Exchanger and Shell and Tube Heat Exchanger
			CO3	Familiar with Extended surface, Evaporators and Agitated vessels
	CHL504	Chemical Engineering Lab VI (CRE-I)	CO1	Students will able to determine kinetics of reation using Integral Method

			CO2	Students will able to determine kinetics of reation using Differential method
			CO3	Students will able to understant and determine effect of tenperature on the reaction
			CO4	Students will able to evaluate the Constant Stirred tank reactor performance
			CO5	Students will able to evaluate the Plug Flow reactor performance
			CO6	Students will able to understant and evaluate the perfomrce of combined reactor system
THIRD YEAR / 6th SEMESTER/ C Scheme/ R-2016	CHC601	Environmental Engineering (EE)	CO1	To understand Importance of environmental pollution, such as air, water, solid, noise. Various pollutants sources, adverse effects, Environmental Legislation
			CO2	To understand meteorological aspects air pollutant dispersion. Sampling and measurement, Control Methods and Equipment:
			CO3	To understand Sampling, measurement of various water pollutants.
			CO4	To understand and design various Waste Water Treatments,
	CHC602	Mass transfer Operations –II (MTO-II)	CO1	To understand Vapor liquid equilibrium and study different types of distillation and equipment's for distillation

			CO2	To study various contact patterns and equipment of extraction and leaching
			CO3	To study batch, semi batch and continuous adsorption.
			CO4	choose the separation operation which will be economical for the process
			CO5	optimize the process parameters
			CO6	understand membrane separation processes principle and working
	CHC603	Transport Phenomenon	CO1	Understanding of transport processes.
			CO2	Student will learn to establish and simplify appropriate conservation statements for momentum, energy and mass transfer processes.
			CO3	Ability to do momentum, energy and mass transfer analysis.
			CO4	To apply conservation principles, along with appropriate boundary conditions for any chemical engineering problem.
	CHC604	Chemical Reaction Engineering –II (CRE-II)	CO1	Students will be able to understand the concept of Residence Time Distribution (RTD) in various reactors and obtain the actual design parameters to design Real Reactor
			CO2	Students will be able to find the model equation and use this model to design the reactors used for heterogeneous non catalytic reactions

			CO3	Students will be able to apply the knowledge they have gained to develop kinetic model and Design strategy for heterogeneous catalytic reactions
			CO4	Students will be able to apply the knowledge they have gained to develop kinetic model and use this model to design the reactors used for Fluid-Fluid reactions
			CO5	
			CO6	
	CHC605	Plant Engineering & Industrial Safety	CO1	Students should be able to identify the causative and initiating factors of accidents. They should be able to make quantitative assessment of vapour release and noise impact
			CO2	Students should be able to understand and evaluate situations causing industrial fire and evaluate risk
			CO3	Students should learn and understand type of boilers and be able to calculate its efficiency
			CO4	Students should be able to calculate work requirements for compressors and draw schematic of instrument air, plant air and venting system.
	CHDE6021	Department Elective IIComputational Fluid Dynamics (	CO1	The student will be able to obtain flow profiles for some simple applications using Scilab

		CO2	The student will be able to use appropriate software for solving realistic problems.
CHDE6023	Biotechnology (CHDE6023)	CO1	Students will demonstrate the knowledge of biotechnology in various fields
		CO2	Students will know cell and metabolism
		CO3	Students will have deep knowledge of biological polymers
		CO4	Students will have deep knowledge of enzymes.
		CO5	Students will able to know about other uses of biotechnology in medical/pharmaceutical field and industrial genetics.
		CO6	Students will be able to understand how biotechnology helps in agriculture, food and beverage industry, chemical industries, environment, and energy sectors.
CHL601	Chemical Engineering Lab VII (EE)	CO1	To understand the air and water pollution standards
		CO2	To study the properties of water and its pollution sources, measurement and control techniques
		CO3	To study the properties of air and its pollution sources, measurement and control techniques
		CO4	To understand the solid waste and noise pollution management

CHL602	Chemical Engineering Lab VIII (MTO-II)	CO1		To understand different types of distillations and to obtain VLE data for binary systems. Also, to check experimental and theoretical results for flash, differential and fractional distillation. Students will also find no of stages at total reflux for fractional distillation.
		CO2		To study extraction and find distribution coefficient in binary system. Also, to perform cross current multistage extraction and compare it with single stage extraction.
		CO3		. To determine recovery in single and multistage leaching.
		CO4		To verify isotherms for adsorption. Also, to draw break through curve for fixed bed adsorption and determine breakthrough time.
		CO5	To determine yield in crystallization	
		CO6	To study distillation, adsorption, extraction leaching equipments and their working	
CHL603	Chemical Engineering Lab IX CRE-II)	CO1	Determination of Residence Time Distribution (RTD) In Continuous Stirred Tank Reactor (CSTR)- Pulse Input	
		CO2	Determination of Residence Time Distribution (RTD) In Plug Flow Reactor (PFR) – Pulse Input	
		CO3	Determination of Residence Time Distribution (RTD) In Packed Bed Reactor (PBR) – Pulse Input	

			CO4	Determination of Residence Time Distribution (RTD) In Continuous Stirred Tank Reactor (CSTR) – Step Input
			CO5	Determination of Void volume, Porosity and solid density of catalyst
			CO6	Determination of conversion in Semibatch reactor
LAST YEAR / 7th SEMESTER/ Rev 2016	CHC701	Process Equipment Design. (PED)	CO1	Design heat exchanger and evaporator.
			CO2	Design distillation and absorption columns
			CO3	Design high pressure vessels.
			CO4	Explain different flow sheet presentation and equipment inspection methods.
	CHC702	Process Engineering	CO1	The graduates are expected to have ability to apply knowledge of mathematics, science and engineering.
			CO2	The graduates are expected to have ability to design a system, a component, or a process to meet the desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability.
			CO3	The graduates are expected to possess ability to function on multi disciplinary teams.
			CO4	The graduates are expected to possess ability to identify, formulate and solve engineering problems.

		CO5	The graduates are expected to have an understanding of professional and ethical responsibility.
		CO6	The graduates are expected to engage themselves in lifelong learning.
		CO7	The graduates are expected to posses' ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
CHC703	Process Dynamics and Control (PDC)	CO1	**To model and study the response of steady and dynamic system of chemical engineering process.**
		CO2	**To design a controllers for chemical process.**
CHDE703.3	Department Elective III Petroleum ref tech	CO1	Characterize crude petroleum and petroleum refinery
		CO2	Fractionate crude petroleum into useful fractions
		CO3	Measure important physical properties of petroleum products
		CO4	Apply refinery processes to maximize desired petro products
		CO5	Use treatment techniques to purify petro products
		CO6	Manufacture widely used petrochemicals
ILO7018	Institute Elective IEnergy Audit and	CO1	To identify and describe present state of energy security and its importance.

		Management (ILO7018	CO2	To identify and describe the basic principles and methodologies adopted in energy audit of an utility.
			CO3	To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities.
			CO4	To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities
			CO5	To analyze the data collected during performance evaluation and recommend energy saving measures
CHP701	Project A		CO1	Identify advanced topic in chemical engineering based on the technology, its application, and its future potential.
			CO2	Demonstrate a sound technical knowledge of the selected project topic focused on solutions to industrial, societal, and environmental problems with the application of sustainable technology.
			CO3	Carry out market study on the product and find demand supply gap for manufacturing projects.
			CO4	Carry out thorough literature survey on the selected topic and identify research gaps for research projects.

		CO5	Carry out profitability analysis for the selected product.
		CO6	Communicate the literature review, proposed work at various platforms for further suggestions, improvement.
CHS701	Seminar	CO1	Students will be able to exhibit their presentation skills
		CO2	Students will be able to discuss topics and express their ideas
		CO3	Stuydent will improve critical thinking
		CO4	Students will undestand new developments in the field domain
		CO5	Students will develop interdisciplinary approach
		CO6	Students will develop their communication and conviencing ability through Q and A session
CHL701	PED Lab	CO1	Students will be able to design heat exchamger
		CO2	Students will be able to design Short Tube vertical Evaporator
		CO3	Students will be able to design Distillation Column
		CO4	Students will be able to understand design aspects of High Pressure vessels

	CHL702	Chemical Engineering Lab X (PDC)	CO1	**Analyze the dynamic behaviour of process**
			CO2	**Evalute control parameters for the given process**
LAST YEAR / 8th SEMESTER/ Rev 2016	CHC801	Modeling, Simulation & Optimization (MSO)	CO1	**Develop the linear and non-linear mass and energy balance equations for individual as well as multiple units.**
			CO2	**Estimate the sequential and equation oriented simulation of complete flow sheets.**
			CO3	**Optimize typical chemical processes.**
	CHC802	Project Engineering and Enterprenuirship managament	CO1	concepts and knowledge of project management to manage projects in process industries
			CO2	Students should be able to prepare feasibility reports.
			CO3	Students should be able to understand various clearances required to start industry
			CO4	Students should be able to prepare project organization charts and contracts
			CO5	Students should be able to prepare contracts
			CO6	Students should be able to use tools of PM to solve problems and will be motivated to become entrepreneurs

Gharda Institute of Technology

	CHC803	Energy System Design	CO1	The graduates should able to design an energy system to meet the desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability
			CO2	The graduates should able to function on multidisciplinary teams, identify, formulate and solve engineering problems
			CO3	The graduates are expected to have knowledge of professional and ethical responsibility
			CO4	The graduates should able to use the techniques, skills, and modern engineering tools necessary for engineering practice
	CHDE8043	Advanced Separation Technology (CHDE8043)	CO1	The graduates are expected to have ability to apply knowledge of mathematics, science and engineering.
			CO2	The graduates are expected to have ability to design a system, a component, or a process to meet the desired needs within realistic constraints such as economic, environmental, social, ethical, health and safety, manufacturability and sustainability.
			CO3	The graduates are expected to possess ability to identify, formulate and solve engineering problems.

			CO4	The graduates are expected to possess ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
	ILO8029	. Environmental Management (ILO8029)	CO1	Learner will be able to understand the concept of environmental management
			CO2	Learner will be able to understand ecosystem and interdependence, food chain etc.
			CO3	Learner will be able to understand and interpret environment related legislations
	CHP801	Project B	CO1	Demonstrate a sound technical knowledge of the selected project topic related to industrial, societal and environmental problems with the application of sustainable technology.
			CO2	Carry out problem formulation and solution.
			CO3	Develop flowsheet and PID diagram for manufacturing projects as applicable.
			CO4	Design and perform experiments and analyze results for research project. In case of manufacturing project, develop complete flow sheet and PID diagram.
			CO5	Apply knowledge of the chemical engineering subjects for interpretation and analysis of experimental results and formulate a model and use suitable software for comparing results and optimize the parameters as and when required.

Gharda Institute of Technology

			CO6	
				Write research article, project report and present the findings before experts and society at large.
	CHL801	Chemical Engineering Lab XI (MSO	CO1	**Estimate parameters for optimum process**
			CO2	**Design the chemical process flow through mass and energy balance**

ELECTRONICS & TELECOMMUNICATION ENGINEERING

THIRD YEAR / FIFTH SEMESTER	ECC501	Microprocessor & Peripherals Interfacing	CO1	To understand the basic concepts of microcomputer systems.
			CO2	To develop background knowledge and core expertise in 8086 microprocessor and co-processor 8087.
			CO3	To write assembly language programs for 8086 microprocessor.
			CO4	To understand peripheral devices and their interfacing to 8086 and to study the design aspects of basic microprocessor based system.
	ECC502	Digital Communication	CO1	Understand random variables and random processes of signal
			CO2	Apply the concepts of Information Theory in source coding
			CO3	Evaluate different methods to eliminate Inter-symbol interference
			CO4	Compare different band-pass modulation techniques
			CO5	Evaluate performance of different error control codes

Gharda Institute of Technology

ECC503	Electromagnetic Engineering	CO1	Fields and energies in simple planar, cylindrical, and spherical geometries, Fields conducting and anisotropic mediawithin
		CO2	Electric and magnetic forces on charges, wires, and media Sinusoids and transients on TEM lines with mismatched impedances and tuning
ECC504	Discrete Time Signal Processing	CO1	Understand the concepts of discrete-time Fourier transform and fast Fourier transform.
		CO2	Apply the knowledge of design of IIR digital filters to meet arbitrary specifications.
		CO3	Apply the knowledge of design of FIR digital filters to meet arbitrary specifications.
		CO4	Analyze the effect of hardware limitations on performance of digital filters.
		CO5	Apply the knowledge of DSP processors for various applications.
ECCDLO 5012	Department Level Optional Course I (TV & Video Engineering)	CO1	Understand overview of TV system.
		CO2	Understand details of compression technique.
		CO3	Know about different dvb standards.
		CO4	Understand advanced digital systems
ECCDLO 5014	Department Level Optional Course I (DCE)	CO1	Implement text, audio and video compression techniques.
		CO2	Understand Symmetric and Asymmetric Key Cryptography schemes.
		CO3	Understand network security
ECL501		CO1	To understand the basic concepts of microcomputer systems.

		Microprocessor & Peripherals Interfacing Lab	CO2	To develop background knowledge and core expertise in 8086 microprocessor and co-processor 8087.
			CO3	To write assembly language programs for 8086 microprocessor.
			CO4	To understand peripheral devices and their interfacing to 8086 and to study the design aspects of basic microprocessor based system.
	ECL502	Digital Communication Lab	CO1	Understand different modulation techniques
			CO2	Evaluate performance of different error control codes
	ECL503	Business Communication & Ethics Lab	CO1	To inculcate in students professional and ethical attitude, effective communication skills, teamwork, multidisciplinary approach and an ability to understand engineer's social responsibilities.
			CO2	To provide students with an academic environment where they will be aware of the excellence, leadership and lifelong learning needed for a successful professional career.
			CO3	To inculcate professional ethics and codes of professional practice and leadership.
			CO4	To prepare students for successful careers that meet the global industrial and corporate requirement provide an environment for students to work on multidisciplinary projects as team members to enhance leadership, motivation and teamwork.

Gharda Institute of Technology

	ECL504	Open Source Technology for Communication Lab	CO1	Learn open source programming tools for communication technology
			CO2	Simulate and analyze the performance of communication system.
			CO3	Implement the communication system/subsystem
	ECCDLO 501X	Department Level Optional Course I (TV & Video Engineering)	CO1	Understand overview of TV system.
			CO2	Understand details of compression technique.
			CO3	Know about different dvb standards.
			CO4	Understand advanced digital systems
THIRD YEAR / SIXTH SEMESTER	ECC601	Microcontrollers & Applications	CO1	Understand the detailed architecture of 8051 and ARM7 microcontroller.
			CO2	Study the in-depth working of the microcontrollers and their Instruction set.
			CO3	Interface various peripheral devices to the microcontrollers.
			CO4	Write Assembly language and Embedded C program for microcontrollers.
	ECC602	Computer Communication Networks	CO1	Design a small or medium sized computer network including media types, end devices, andinterconnecting devices that meets a customer's specific needs.
			CO2	Perform basic configurations on routers and Ethernet switches.
			CO3	Demonstrate knowledge of programming for network communications.
			CO4	Learn to simulate computer networks and analyse the simulation results.

			CO5	Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model.
			CO6	Develop knowledge and skills necessary to gain employment as computer network engineer and network administrator.
	ECC603	Antenna & Radio Wave Propagation	CO1	Define basic antenna parameter like radiation pattern, directivity and gain
			CO2	Derive the field equations for the basic radiating elements like linear wire antenna and loop antenna.
			CO3	Design of uniform linear and planer antenna arrays using isotropic and directional antenna.
	ECC604	Image Processing and Machine Vision	CO1	Understand theory and models in image processing
			CO2	Interpret and analyze 2D signals in Spatial and frequency domain through image transforms
			CO3	Apply quantitative models of image processing for segmentation and restoration for various applications.
			CO4	Find shape using various representation techniques and classify the object using different classification methods
	ECCDLO6022	Department Level Optional Course II (Radar Engineering)	CO1	Explain generalized concept of RADAR.
			CO2	Solve problems using radar equations
			CO3	Describe different types of radar for specific application.
			CO4	Explain concept of tracking radar.

			CO5	Evaluate the design constraints for transmitter.
			CO6	Evaluate the design constraints for receiver.
	ECL601	Microcontroller & Applications Lab	CO1	Interface various peripheral devices to the microcontrollers.
			CO2	Write Assembly language and Embedded C program for microcontrollers.
			CO3	Students should be able to communicate Microcontroller effectively both verbally and in writing.
	ECL602	Computer Communication Network Lab	CO1	Design a small or medium sized computer network including media types, end devices, andinterconnecting devices that meets a customer's specific needs.
			CO2	Perform basic configurations on routers and Ethernet switches.
			CO3	Demonstrate knowledge of programming for network communications.
			CO4	Learn to simulate computer networks and analyse the simulation results.
			CO5	Troubleshoot connectivity problems in a host occurring at multiple layers of the OSI model.
			CO6	Develop knowledge and skills necessary to gain employment as computer network engineer and network administrator.
	ECL603		CO1	Define basic antenna parameter like radiation pattern, directivity and gain

Gharda Institute of Technology

		Antenna & Radio Wave Propagation Lab	CO2	Derive the field equations for the basic radiating elements like linear wire antenna and loop antenna.
			CO3	Design of uniform linear and planer antenna arrays using isotropic and directional antenna.
	ECL604	Image Processing and Machine Vision Lab	CO1	Understand theory and models in image processing
			CO2	Interpret and analyze 2D signals in Spatial and frequency domain through image transforms
			CO3	Apply quantitative models of image processing for segmentation and restoration for various applications.
			CO4	Find shape using various representation techniques and classify the object using different classification methods
	ECLDLO6022	Department Level Optional Lab II (Radar Engineering)	CO1	Explain generalized concept of RADAR.
			CO2	Solve problems using radar equations.
			CO3	Describe different types of radar for specific application.
			CO4	Explain concept of tracking radar.
			CO5	Evaluate the design constraints for transmitter.
FINAL YEAR / SEVENTH SEMESTER	ECC701	Microwave Engineering	CO1	Able to characterize devices at higher frequencies.
			CO2	Able to design and analyze microwave circuits.
			CO3	Able to design and analyze amplifiers and oscillators at microwave frequencies.

		CO4	Able to demonstrate skills of planning, design and deployment of microwave networks
ECC702	Mobile Communication System	CO1	Explain the cellular fundamentals and estimate the coverage and capacity of cellular systems
		CO2	Classify different types of propagation models
		CO3	and analyse the link budget
ECC703	Optical Communication	CO1	List, write and explain fundamentals and transmission characteristics of optical fiber communication
		CO2	List, write and explain principles and characteristics of various sources ,detectors .
		CO3	Conduct experiments as well as analyze and interpret data using various fiber optic components
		CO4	Calculate parameters for optical link budgeting and analyze the link
ECCDLO7035	Department Level Optional Course III (Embedded System)	CO1	Understand the detailed processor design techniques and methods of communication.
		CO2	Study the in-depth program modelling concepts.
		CO3	Study the concepts of Real time operating systems and write programs
		CO4	Design embedded system applications using RTOS
ECCDLO7033	Department Level Optional Course III (Internet of	CO1	Explain the operation of the components of a router including, DHCP, NAT/PAT, Routing function, Switching function.

		Communication Engineering)	CO2	Describe how DNS works in the global Internet including caching and root servers.
			CO3	Understand the current state-of-the-art developments in Internet technologies for multimedia communications.
			CO4	Understand the security protocol and services In the Internet
			CO5	Appreciate the principles used in designing multimedia protocols, and so understand why standard protocols are designed the way that they are.
			CO6	Understand the system design principles of multimedia communications systems.
			CO7	Solve problems and design simple networked multimedia systems.
	ILO701X	Institute Level Optional Course I (Management Information System)	CO1	Able to demonstrate the impact information systems have on an organization
			CO2	Study IT infrastructure and its components and its current trends
			CO3	Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making
	ECL701	Microwave Engineering Lab -	CO1	Able to characterize devices at higher frequencies.
			CO2	Able to design and analyze microwave circuits.
			CO3	Able to design and analyze amplifiers and oscillators at microwave frequencies.

			CO4	Able to demonstrate skills of planning, design and deployment of microwave networks
	ECL702	Mobile Communication System Lab	CO1	Explain the cellular fundamentals and estimate the coverage and capacity of cellular systems
			CO2	Classify different types of propagation models and analyse the link budget
			CO3	Apply the concepts of 3G technologies of UMTS and CDMA 2000.
	ECL703	Optical Communication Lab -	CO1	Understand the function of various optical components and their performance.
			CO2	Realize optical system and study important parameters like NA .
			CO3	To understand operation of optical source and detectors.
	ECLDLO7033	Department Level Optional Lab III (Internet of communication Engineering)	CO1	Explain the operation of the components of a router including, DHCP, NAT/PAT, Routing function, Switching function.
			CO2	Describe how DNS works in the global Internet including caching and root servers.
			CO3	Understand the current state-of-the-art developments in Internet technologies for multimedia communications.
			CO4	Understand the security protocol and services In the Internet

			CO5	Appreciate the principles used in designing multimedia protocols, and so understand why standard protocols are designed the way that they are.
			CO6	Understand the system design principles of multimedia communications systems.
			CO7	Solve problems and design simple networked multimedia systems.
	ECLDLO7035	Department Level Optional Lab III (Embedded System)	CO1	Understand the detailed processor design techniques and methods of communication.
			CO2	Study the in-depth program modelling concepts.
			CO3	Study the concepts of Real time operating systems and write programs
			CO4	Design embedded system applications using RTOS
	ECL704	Project-I	CO1	Identify problems based on societal /research needs.
			CO2	Apply Knowledge and skill to solve societal problems in a group.
			CO3	Develop interpersonal skills to work as member of a group or leader.
			CO4	Draw the proper inferences from available results through theoretical/ experimental/simulations using standard norms of Engineering practices
			CO5	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.

			CO6	Demonstrate project management principles during project work.
			CO7	Excel in written and oral communication.
FINAL YEAR / EIGHTH SEMESTER	ECC801	RF Design	CO1	Design impedance matching networks and passive RF filters.
			CO2	Design and appraise RF amplifiers and oscillators.
			CO3	Analyze EMI and EMC in RF circuits.
	ECC802	Wireless Networks	CO1	Explain the working of different wireless technologies like bluetooth and zigbee
			CO2	Understand the working of wireless LAN, PAN & MAN
			CO3	Analyze the different types of Wireless Networks like LAN,PAN & MAN
	ECCDLO804X	Department Level Optional Course IV (Network Management in Telecommunications)	CO1	Explain the need for interoperable network management; analyze the trends & development of Telecommunications Network Management.
			CO2	Demonstrate broad knowledge of fundamental principles & technical standards underlying.
			CO3	Describe the concepts and architecture behind standards based network management associated with SNMP & CMIP.
			CO4	Apply basic of telecommunication, networking, information technologies, and architect and implement networked informative systems.

		CO5	Continuous improve their technology knowledge and communication skills
ECCDLO 8043	Department Level Optional Course IV (Satellite Communication)	CO1	Explain basics of satellite communication, space segment and earth segment
		CO2	Understand different satellite orbits and orbital parameters
		CO3	Explain and analyse link budget of satellite signal for proper communication
		CO4	Understand various applications of satellite communication
ECCILO8029	Institute Level Optional Course II (Environment Management)	CO1	Understand the concept of environmental management
		CO2	Understand ecosystem and interdependence, food chain etc.
		CO3	Understand and interpret environment related legislations
ECL801	RF Design Lab	CO1	Design impedance matching networks and passive RF filters.
		CO2	Design and appraise RF amplifiers and oscillators.
		CO3	Analyze EMI and EMC in RF circuits.
ECL802 1 1	Wireless Networks Lab	CO1	Explain the working of different wireless technologies like Bluetooth and zigbee
		CO2	Understand the working of wireless LAN, PAN & MAN
		CO3	Analyze the different types of Wireless Networks like LAN,PAN & MAN

Gharda Institute of Technology

ECLDLO8043	Satellite Communication	CO1	Explain basics of satellite communication, space segment and earth segment	
		CO2	Understand different satellite orbits and orbital parameters	
		CO3	Explain and analyse link budget of satellite signal for proper communication	
		CO4	Understand various applications of satellite communication	
ECCDLO804X	Department Level Optional Course IV (Network Management in Telecommunications)	CO1	Explain the need for interoperable network management; analyze the trends & development of Telecommunications Network Management.	
		CO2	Demonstrate broad knowledge of fundamental principles & technical standards underlying.	
		CO3	Describe the concepts and architecture behind standards based network management associated with SNMP & CMIP.	
		CO4	Apply basic of telecommunication, networking, information technologies, and architect and implement networked informative systems.	
		CO5	Continuous improve their technology knowledge and communication skills	
ECL803	Project-II	CO1	Identify problems based on societal /research needs.	
		CO2	Apply Knowledge and skill to solve societal problems in a group.	

			CO3	Develop interpersonal skills to work as member of a group or leader.
			CO4	Draw the proper inferences from available results through theoretical/ experimental/simulations using standard norms of Engineering practices
			CO5	Demonstrate capabilities of self-learning in a group, which leads to lifelong learning.
			CO6	Demonstrate project management principles during project work.
			CO7	Excel in written and oral communication.

MECHANICAL ENGINEERING

THIRD YEAR / 5th SEMESTER/ C Scheme/ R-2016	MEC501	Internal Combustion Engines	CO1	Demonstrate the working of different systems and processes of S.I. engines
			CO2	Demonstrate the working of different systems and processes of C.I. engines
			CO3	Illustrate the working of lubrication, cooling and supercharging systems.
			CO4	Analyse engine performance
			CO5	Illustrate emission norms and emission control
			CO6	Comprehend the different technological advances in engines and alternate fuels
	MEC502	Mechanical Measurement and Control	CO1	Classify various types of static characteristics and types of errors occurring in the system.
			CO2	Classify and select proper measuring instrument for linear and angular displacement
			CO3	Classify and select proper measuring instrument for pressure and temperature measurement

			CO4	Design mathematical model of system/process for standard input responses
			CO5	Analyse error and differentiate various types of control systems and time domain specifications
			CO6	Analyse the problems associated with stability
	MEC 503	Heat Transfer	CO1	Identify the three modes of heat transfer (conduction, convection and radiation).
			CO2	Illustrate basic modes of heat transfer
			CO3	Develop mathematical model for each mode of heat transfer
			CO4	Develop mathematical model for transient heat transfer
			CO5	Demonstrate and explain mechanism of boiling and condensation
			CO6	Analyse different heat exchangers and quantify their performance
	MEC504	Dynamics of Machinery	CO1	Demonstrate working Principles of different types of governors and Gyroscopic effects on the mechanical systems
			CO2	Illustrate basic of static and dynamic forces
			CO3	Determine natural frequency of element/system
			CO4	Determine vibration response of mechanical elements / systems
			CO5	Design vibration isolation system for a specific application
			CO6	Demonstrate basic concepts of balancing of forces and couples
	MEDLO5011	Press Tool Design	CO1	Demonstrate various press working operations for mass production of sheet metal parts
			CO2	Identify press tool requirements to build concepts pertaining to design of press tools

			CO3	Prepare working drawings and setup for economic production of sheet metal components
			CO4	Select suitable materials for different elements of press tools
			CO5	Illustrate the principles and blank development in bent & drawn components
			CO6	Elaborate failure mechanisms of pressed components, safety aspects and automation in press working
	MEDLO5012	Machining Sciences And Tool Design	CO1	Calculate the values of various forces involved in the machining operations
			CO2	Design various single and multipoint cutting tools
			CO3	Analyse heat generation in machining operation and coolant operations
			CO4	Illustrate the properties of various cutting tool materials and hence select an appropriate tool material for particular machining application
			CO5	Demonstrate the inter-relationship between cutting parameters and machining performance measures like power requirement, cutting time, tool life and surface finish
			CO6	Analyse economics of machining operations
	MEDLO5013	Design of Jigs and Fixtures	CO1	Write methodically, the sequence of operations of simple work-piece
			CO2	Identify and select locating and clamping points on work-piece
			CO3	Demonstrate construction of drill jig
			CO4	Illustrate construction of milling fixture
			CO5	Identify appropriate combination of tools, jigs and fixture, suitable for a particular machining operation
			CO6	Design assembly of jigs and fixtures on simple work-piece

Gharda Institute of Technology

MEL 501	Internal Combustion Engines Lab	CO1	Dismantle engine assembly	
		CO2	Overhaul and Assemble engine components	
		CO3	Perform load test/speed test on engine setup	
		CO4	Calculate performance of multi cylinder engine	
		CO5	Analyse engine performance and draw heat balance sheet	
		CO6	Perform exhaust gas analysis	
MEL 502	Mechanical Measurement and Control	CO1	Calibrate displacement sensors	
		CO2	Calibrate pressure and vacuum gauges	
		CO3	Measure torque using strain gauges	
		CO4	Identify system/process characteristics for standard input responses	
		CO5	Identify various types of control systems and time domain specifications	
		CO6	Analyse the problems associated with stability	
MEL 503	Heat Transfer Lab	CO1	Estimate thermal conductivity of metals/non metals/liquids	
		CO2	Compute heat transfer coefficient in natural as well forced convection	
		CO3	Measure emissivity of grey body	
		CO4	Quantify fin effectiveness/efficiency	
		CO5	Analyse heat exchanger performance	
		CO6	Demonstrate energy balance for heat exchanger	
MEL504	Dynamics of Machinery	CO1	Plot and analyse governor characteristics	
		CO2	Analyse gyroscopic effect on laboratory model	
		CO3	Estimate natural frequency of mechanical systems	
		CO4	Analyse vibration response of mechanical systems	
		CO5	Determine damping coefficient of a system	
		CO6	Balance rotating mass	
MEL 505	Manufacturing Sciences Lab	CO1	Estimate machining time for simple and taper turning operations on lathe	

			CO2	Estimate machining time for threading/knurling operations on lathe	
			CO3	Estimate machining time for various machining operations on shaper	
			CO4	Perform NC, CNC and DNC machining operations	
			CO5	Write CNC program for different operations	
			CO6	Identify machining parameters for various Non Traditional machining operations	
	MEL506	Business Communication & Ethics	CO1	Design a technical document using precise language, suitable vocabulary and apt style.	
			CO2	Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships.	
			CO3	Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities.	
			CO4	Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP.	
			CO5	Deliver formal presentations effectively implementing the verbal and non-verbal skills	
THIRD YEAR / 6th SEMESTER/ C Scheme/ R-2016	MEC 601	Metrology and Quality Engineering	CO1	Demonstrate inspection methods and different gauges	
			CO2	Illustrate working principle of measuring instruments and calibration methodology	
			CO3	Illustrate basic concepts and statistical methods in quality control	
			CO4	Demonstrate characteristics of screw threads, gear profile, and tool profile	
			CO5	Illustrate the different sampling techniques in quality control	
			CO6	Illustrate different nondestructive techniques used for quality evaluation	

Gharda Institute of Technology

MEC602	MACHINE DESIGN – I	CO1	Demonstrate understanding of various design considerations	
		CO2	Illustrate basic principles of machine design	
		CO3	Design machine elements for static as well as dynamic loading	
		CO4	Design machine elements on the basis of strength/ rigidity concepts	
		CO5	Use design data books in designing various components	
		CO6	Acquire skill in preparing production drawings pertaining to various designs	
MEC603	Finite Element Analysis	CO1	Solve differential equations using weighted residual methods	
		CO2	Develop the finite element equations to model engineering problems governed by second order differential equations	
		CO3	Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements	
		CO4	Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements	
		CO5	Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system	
		CO6	Use commercial FEA software, to solve problems related to mechanical engineering	
MEC604	Refrigeration and Air Conditioning	CO1	Demonstrate fundamental principles of refrigeration and air conditioning	
		CO2	Identify and locate various important components of the refrigeration and air conditioning system	

		CO3	Illustrate various refrigeration and air conditioning processes using psychometric chart
		CO4	Design Air Conditioning system using cooling load calculations.
		CO5	Estimate air conditioning system parameters
		CO6	Demonstrate understanding of duct design concepts
MEDLO6021	Mechatronics	CO1	Identify the suitable sensor and actuator for a mechatronics system
		CO2	Select suitable logic controls
		CO3	Analyse continuous control logics for standard input conditions
		CO4	Develop ladder logic programming
		CO5	Design hydraulic/pneumatic circuits
		CO6	Design a mechatronic system
MEDLO6022	Robotics	CO1	Demonstrate the basic functioning of a robot
		CO2	Identify various components of robots
		CO3	Carryout kinematic analysis, workspace analysis, and trajectory planning for a robot
		CO4	Identify suitable sensors/actuators for robot
		CO5	Select an appropriate robot for given industrial inspection and material handling systems.
		CO6	Illustrate various aspects of a robot as a humanoid
MEDLO6023	Industrial Automation	CO1	Demonstrate basics of industrial automation
		CO2	Identify various types of automation
		CO3	Demonstrate use of automated controls using pneumatic and hydraulic systems.
		CO4	Illustrate the control systems in automated system.
		CO5	Demonstrate applicability of PLC in process industry
		CO6	Design elecrto-pneumatic circuits
MEL601	Metrology and Quality Engineering	CO1	Measure linear and angular dimensions
		CO2	Measure surface roughness

			CO3	Measure various parameters of gear tooth profile
			CO4	Use optical profile projector for measurement
			CO5	Use various instruments for measurement of screw threads
			CO6	Measure flatness by Autocollimator / Interferometry method
	MEL602	Machine Design –I	CO1	Design shaft under various conditions
			CO2	Design Knuckle Joint / cotter joint
			CO3	Design Screw Jack/C-clamp along with frame
			CO4	Design Flexible flange couplings/ Leaf spring
			CO5	Convert design dimensions into working/manufacturing drawing
			CO6	Use design data book/standard codes to standardise the designed dimensions
	MEL603	Finite Element Analysis	CO1	Select appropriate element for given problem
			CO2	Select suitable meshing and perform convergence test
			CO3	Select appropriate solver for given problem
			CO4	Interpret the result
			CO5	Apply basic aspects of FEA to solve engineering problems
			CO6	Validate FEA solution
	MEL604	Refrigeration and Air Conditioning TW/Practical	CO1	Demonstrate fundamental principles of refrigeration and air conditioning
			CO2	Identify and locate various important components of the refrigeration and air conditioning system
			CO3	Represent various refrigeration and air conditioning processes using psychometric chart
			CO4	Operate and maintain refrigeration system
			CO5	Operate and maintain air conditioning system
			CO6	Simulate VCRS

Gharda Institute of Technology

	MEL 605	Mechatronics Lab	CO1	Demonstrate implementation of interfacing sensors and actuators using microcontrollers
			CO2	Demonstrate of interfacing various utilities with microcontrollers
			CO3	Demonstrate discrete control system using PLC microcontroller
			CO4	Design and develop a control system for specific use
			CO5	Implement program to PLC system and demonstrate its application
			CO6	Develop pneumatic circuits for a specific system
LAST YEAR / 7th SEMESTER/ Rev 2016	MEC701	Machine Design – II	CO1	Select appropriate gears for power transmission on the basis of given load and speed
			CO2	Design gears based on the given conditions.
			CO3	Select bearings for a given applications from the manufacturers catalogue.
			CO4	Select and/or design belts and flywheel for given applications
			CO5	Design cam and follower mechanisms.
			CO6	Design clutches and brakes
	MEC702	CAD/CAM/CAE	CO1	Identify proper computer graphics techniques for geometric modelling.
			CO2	Transform, manipulate objects & store and manage data.
			CO3	CAM Toolpath Creation and NC- G code output.
			CO4	Use rapid prototyping and tooling concepts in any real life applications.
			CO5	Identify the tools for Analysis of a complex engineering component
	MEC703	Production Planning and Control	CO1	Illustrate production planning functions and manage manufacturing functions in a better way
			CO2	Develop competency in scheduling and sequencing of manufacturing operations

			CO3	Forecast the demand of the product and prepare an aggregate plan
			CO4	Develop the skills of Inventory Management and cost effectiveness
			CO5	Create a logical approach to Line Balancing in various production systems
			CO6	Implement techniques of manufacturing planning and control
	MEDLO7031	MECHANICAL VIBRATION	CO1	Develop mathematical model to represent dynamic system.
			CO2	Estimate natural frequency of mechanical element / system.
			CO3	Analyse vibratory response of mechanical element / system.
			CO4	Estimate the parameters of vibration isolation system and
			CO5	Control the vibrations to the acceptable level using basic vibration principles
			CO6	Handle the vibration measuring instruments
	MEDLO7032	AUTOMOBILE ENGINEERING	CO1	Illustrate the types and working of clutch and transmission system.
			CO2	Demonstrate the working of different types of final drives, steering gears and braking systems
			CO3	Illustrate the constructional features of wheels, tyres and suspension systems
			CO4	Demonstrate the understanding of types of storage, charging and starting systems
			CO5	Identify the type of body and chassis of an automobile
			CO6	Comprehend the different technological advances in automobile
	MEDLO7033		CO1	Select suitable Pump

	Pumps, Compressors and Fans	CO2	Design a reciprocating pump and analyse its performance
		CO3	Design a centrifugal pump and analyse its performance
		CO4	Demonstrate basic principles of fans and blowers
		CO5	Design fan/blower and analyse its performance
		CO6	Design a compressor and analyse its performance
MEDLO7034	Computational Fluid Dynamics	CO1	Demonstrate methodology to work with CFD
		CO2	Illustrate principles of grid generation and discritisation methods
		CO3	Identify and apply specific boundary conditions relevant to specific application
		CO4	Decide solution parameters relevant to specific application
		CO5	Analyze the results and draw the appropriate inferences
		CO6	Demonstrate basic principles of FVM
ILO 7011	Product Life Cycle Management	CO1	Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation.
		CO2	Illustrate various approaches and techniques for designing and developing products.
		CO3	Apply product engineering guidelines / thumb rules in designing products for moulding, machining, sheet metal working etc.
		CO4	Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant
ILO 7012	Reliability Engineering	CO1	Understand and apply the concept of Probability to engineering problems
		CO2	Apply various reliability concepts to calculate different reliability parameters

			CO3	Estimate the system reliability of simple and complex systems
			CO4	Carry out a Failure Mode Effect and Criticality Analysis
	ILO 7013	Management Information System	CO1	Explain how information systems Transform Business
			CO2	Identify the impact information systems have on an organization
			CO3	Describe IT infrastructure and its components and its current trends
			CO4	Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making
			CO5	Identify the types of systems used for enterprise-wide knowledge management and how they provide value for businesses
	ILO 7014	Design of Experiments	CO1	Plan data collection, to turn data into information and to make decisions that lead to appropriate action
			CO2	Apply the methods taught to real life situations
			CO3	Plan, analyze, and interpret the results of experiments
	ILO 7015	Operations Research	CO1	Understand the theoretical workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness.
			CO2	Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change.
			CO3	Solve specialized linear programming problems like the transportation and assignment problems, solve network models like the shortest path, minimum spanning tree, and maximum flow problems.

		CO4	Understand the applications of integer programming and a queuing model and compute important performance measures
ILO 7016	Cyber Security and Laws	CO1	Understand the concept of cybercrime and its effect on outside world
		CO2	Interpret and apply IT law in various legal issues
		CO3	Distinguish different aspects of cyber law
		CO4	Apply Information Security Standards compliance during software design and development
ILO 7017	Disaster Management and Mitigation Measures	CO1	Get to know natural as well as manmade disaster and their extent and possible effects on the economy.
		CO2	Plan of national importance structures based upon the previous history.
		CO3	Get acquainted with government policies, acts and various organizational structure associated with an emergency.
		CO4	Get to know the simple do's and don'ts in such extreme events and act accordingly.
ILO 7018	Energy Audit and Management	CO1	To identify and describe present state of energy security and its importance.
		CO2	To identify and describe the basic principles and methodologies adopted in energy audit of an utility.
		CO3	To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities.
		CO4	To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities
		CO5	To analyze the data collected during performance evaluation and recommend energy saving measures
ILO7019	Development Engineering	CO1	Apply knowledge for Rural Development.
		CO2	Apply knowledge for Management Issues.

			CO3	Apply knowledge for Initiatives and Strategies
			CO4	Develop acumen for higher education and research.
			CO5	Master the art of working in group of different nature.
			CO6	Develop confidence to take up rural project activities independently
MEL701	Machine Design –II		CO1	Design gears based on the given conditions
			CO2	Design gearbox for a given application
			CO3	Design cam & followers for a given condition
			CO4	Design clutches for a given application
			CO5	Design brakes for given condition
			CO6	Select bearings for a given applications from the manufacturers catalogue
MEL702	CAD/CAM/CAE		CO1	Identify proper computer graphics techniques for geometric modelling.
			CO2	Transform, manipulate objects as well as store and manage data.
			CO3	Create CAM Toolpath and prepare NC- G code
			CO4	Apply rapid prototyping and tooling concepts in any real life applications.
			CO5	Identify the tools for Analysis of a complex engineering component.
MEL703	Production Planning and Control		CO1	Prepare a process sheet
			CO2	Prepare a Gantt Chart
			CO3	Forecast the demand of the product and prepare an aggregate plan.
			CO4	Perform ABC analysis of a given problem
			CO5	Develop the skills of Inventory Management and cost effectiveness.
			CO6	Create a logical approach to Line Balancing for various production systems.
MEC801			CO1	Apply the concept of system design.

LAST YEAR / 8th SEMESTER/ Rev 2016		Design of Mechanical Systems	CO2	Design material handling systems such as hoisting mechanism of EOT crane,
			CO3	Design belt conveyor systems
			CO4	Design engine components such as cylinder, piston, connecting rod and crankshaft
			CO5	Design pumps for the given applications
			CO6	Prepare layout of machine tool gear box and select number of teeth on each gear
	MEC802	Industrial Engineering and Management	CO1	Illustrate the need for optimization of resources and its significance
			CO2	Develop ability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products.
			CO3	Demonstrate the concept of value analysis and its relevance.
			CO4	Manage and implement different concepts involved in method study and understanding of work content in different situations.
			CO5	Describe different aspects of work system design and facilities design pertinent to manufacturing industries.
			CO6	Illustrate concepts of Agile manufacturing, Lean manufacturing and Flexible manufacturing
	MEC803	Power Engineering	CO1	Compute heat interactions in combustion of reactive mixtures
			CO2	Differentiate boilers, boiler mountings and accessories
			CO3	Calculate boiler efficiency and assess boiler performance
			CO4	Demonstrare working cycles ofgas turbines
			CO5	Draw velocity triangles of impulse/reaction turbines and calculate performance parameters/efficiency

			CO6	Demonstrate basic working of pumps
MEDLO8041	Power Plant Engineering		CO1	Comprehend various equipment/systems utilized in power plants
			CO2	Demonstrate site selection methodology, construction and operation of Hydro Electric Power Plants
			CO3	Discuss working, site selection, advantages, disadvantages of steam power plants
			CO4	Discuss operation of Combined Cycle Power Plants
			CO5	Discuss types of reactors, waste disposal issues in nuclear power plants
			CO6	Illustrate power plant economics
MEDLO8042	Rapid Prototyping		CO1	Select the feasible RP process
			CO2	Selct the feasible RP material
			CO3	Gauge and Hybridize the ever-evolving Protoyping Technologies
			CO4	Contribute towards the Product Development at the respective domain in the industry
			CO5	Apply RP to build working prototypes
			CO6	Demonstrate basics of virtual reality
MEDLO8043	Renewable Energy Sources		CO1	Demonstrate need of different renewable energy sources
			CO2	Discuss importance of renewable energy sources
			CO3	Discuss various renewable energy sourses in Indian context
			CO4	Calculate and analyse utilization of solar and wind energy
			CO5	Illustrate design of biogas plant
			CO6	Demonstrate basics of hydrogen energy
MEDLO8044	Energy Management in Utility Systems		CO1	Demonstrate general aspects of energy management
			CO2	Summarize and explain need for energy management, economics and auditing

			CO3	Illustrate basics of energy economics and financial analysis techniques
			CO4	Describe importance of thermal and electrical utilitie's maintenance
			CO5	Assess potential and summarise benefits of waste heat recovery and cogeneration
			CO6	Illustrate waste heat recovery and cogeneration methods
	ILO 8021	Project Management	CO1	Apply selection criteria and select an appropriate project from different options.
			CO2	Write work break down structure for a project and develop a schedule based on it.
			CO3	Identify opportunities and threats to the project and decide an approach to deal with them strategically.
			CO4	Use Earned value technique and determine & predict status of the project.
			CO5	Capture lessons learned during project phases and document them for future reference
	ILO 8022	Finance Management	CO1	Understand Indian finance system and corporate finance
			CO2	Take investment, finance as well as dividend decisions
	ILO8023	Entrepreneurship Development and Management	CO1	Understand the concept of business plan and ownerships
			CO2	Interpret key regulations and legal aspects of entrepreneurship in India
			CO3	Understand government policies for entrepreneurs
	ILO8024	Human Resource Management	CO1	Understand the concepts, aspects, techniques and practices of the human resource management.
			CO2	Understand the Human resource management (HRM) processes, functions, changes and challenges in today's emerging organizational perspective.

			CO3	Gain knowledge about the latest developments and trends in HRM.
			CO4	Apply the knowledge of behavioural skills learnt and integrate it with in inter personal and intergroup environment emerging as future stable engineers and managers.
	ILO8025	Professional Ethics and Corporate Social Responsibility (CSR)	CO1	Understand rights and duties of business
			CO2	Distinguish different aspects of corporate social responsibility
			CO3	Demonstrate professional ethics
			CO4	Understand legal aspects of corporate social responsibility
	ILO8026	Research Methodology	CO1	Prepare a preliminary research design for projects in their subject matter areas
			CO2	Accurately collect, analyze and report data
			CO3	Present complex data or situations clearly
			CO4	Review and analyze research findings
	ILO8027	IPR and Patenting	CO1	understand Intellectual Property assets
			CO2	assist individuals and organizations in capacity building
			CO3	work for development, promotion, protection, compliance, and enforcement of Intellectual Property and Patenting
	ILO 8028	Digital Business Management	CO1	Identify drivers of digital business
			CO2	Illustrate various approaches and techniques for E-business and management
			CO3	Prepare E-business plan
	ILO8029	Environmental Management	CO1	Understand the concept of environmental management
			CO2	Understand ecosystem and interdependence, food chain etc.

			CO3	Understand and interpret environment related legislations
	MEL801	Design of Mechanical Systems	CO1	Apply the concept of system design.
			CO2	Design of hoisting mechanism of EOT crane,
			CO3	Design belt conveyor systems
			CO4	Design pumps for the given applications
			CO5	Design engine components such as cylinder, piston, connecting rod and crankshaft
			CO6	Design of machine tool gearbox
	MEL 802	Power Engineering	CO1	Differentiate boilers
			CO2	Differentiate boiler mountings and accessories
			CO3	Conduct a trial on impilse turbine and analyse its performance
			CO4	Conduct a trail on reaction turbine and analyse its performance
			CO5	Conduct a trial on Centrifugal pump and analyse its perfromance
			CO6	Conduct a trial on Reciprocating pump and analyse its perfromance
	MEP701/ MEP801	Project (I and II)	CO1	Do literature survey/industrial visit and identify the problem
			CO2	Apply basic engineering fundamental in the domain of practical applications
			CO3	Cultivate the habit of working in a team
			CO4	Attempt a problem solution in a right approach
			CO5	Correlate the theoretical and experimental/simulations results and draw the proper inferences
			CO6	Prepare report as per the standard guidelines.