

### <u>Programme Outcomes and Course Outcomes</u> for all Programmes offered by the institution

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# Programme Outcomes





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

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- 2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- 3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
- 4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- 5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.
- 6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- 7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- 8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- 9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- 10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
- 11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
- 12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



# Course Outcomes of CIVIL Department

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#### **Department of CIVIL Engineering**

#### COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and regulation	Course code	Course name		Co's
			CO1	classify the crystal structures, their parameters and draw the various crystal planes using Miller indices.
			CO2	analyze various crystal defects-its types.
			CO3	explain vibrations, radius of gyration, moment of inertia and ultrasonic.
	9НС06	6 APPLIED PHYSICS	CO4	analyze the wave nature of light, superposition principle, differentiation between interference, diffraction and their applications
I-I & A22			CO5	explain about the types of emissions, laser principle, working of different types of lasers and their applications. To understand the nuclear fission and fusion, radioactivity emission of alpha, beta and gamma rays.
			CO6	contrast nano& bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods, analysis techniques like XRD & TEM.
	9FC01	01 Problem Solving using C	CO1	Formulate simple algorithms for arithmetic, logical problems and translate the algorithms to programs (in C language)
			CO2	Execute and test the programs and correct syntax and logical errors, implement conditional branching, iteration and recursion
			CO3	deduce a problem into functions and synthesize a complete program using divide and conquer approach.
			CO4	relate arrays, pointers and structures to formulate algorithms and programs.

				write programs to solve matrix
			CO5	addition and multiplication problems and searching and sorting problems.
			CO6	solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
			CO1	Check the consistency or inconsistency of a linear system and solve the problems.
			CO2	Find the Eigen values and Eigen vectors and solve the problems associated with these concepts.
			CO3	Find the nature, index and signature of the quadratic form.
	9HC11	9HC11: MATRIX ALGEBRA AND CALCULUS	CO4	Verify the applicability of mean value theorems and express the given standard function in series form using Taylor's and Maclaurin series.
			CO5	Find the solutions of first order first degree differential equations and solve the problems on Newton's law of cooling, Natural growth and decay.
			CO6	Solve higher order ordinary differential equations with constant coefficients using some standard methods.
	9HC01	9HC01 ESSENTIAL C01 ENGLISH LANGUAGE SKILLS	CO1	Demonstrate competence with suitable accuracy in vocabulary and language fluency.
			CO2	State the definition of nouns, verbs, adjectives, and adverbs.
			CO3	Identify the differences of each tense and use the tenses accurately.
			CO4	Identify specialized reading strategies for specific types of texts
			CO5	Produce written work that is substantive, organized, and grammatically accurate
-	01000	9HC61-Oral	CO1	Describe people, objects and situations using simple sentences.
	9HC61	Communication LAB - I	CO2	Use appropriate tenses and expressions in different contexts

				of conversations.
			CO3	Identify major areas of concern in their oral communication and address them.
			CO4	Create a SMART plan to enhance their own communication skills in English
			CO1	Analyze the concept of radius of gyration and periodic vibrations,modulus-types, stress, strain and Hook's law.
			CO2	Analyze the LCR circuit combination, parallel, series, electrical resonance, fundamentals of R & C and time constant.
			CO3	Demonstrate the resonance concept, transverse laws of stretched strings, Sonometer, types of waves.
	9HC65	9HC65 APPLIED PHYSICS LAB	CO4	Understand the concepts of interference, conditions, formation of Newton's rings- reason.
			CO5	Recognize the difference between the interference and diffraction, grating, laser characteristics, LED and forward resistance.
			CO6	Explain properties of light, dispersion, prism, minimum deviation,fundamentals of magnetic induction, Ampere's law, Oersted's law and the Biot- Savart law.
			CO1	Enumerate the algorithms for simple problems
			CO2	Classify the given algorithms to a working and correct program
		9FC61 9FC61-Problem Solving using C Lab	CO3	Correct the syntax errors as reported by the compilers
	9FC61		CO4	Identify and correct logical errors encountered at run time
	71 001		CO5	Write iterative as well as recursive programs
			CO6	Represent data in arrays, strings and structures and manipulate them through a program
			C07	Declare pointers of different types and use them in defining self referential structures.

			CO8	Create, read and write to and from simple text files.
			CO1	use the instruments to solve engineering problem and draw various type of curves used in engineering
			CO2	explain Orthographic projections and draw projections of simple drawing entities such as points Lines.
	9BC01	9BC01: ENGINEERING	CO3	Draw projections of different types of regular Planes, solids in various positions wrt principal planes of projection.
		GRAPHICS	CO4	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
			CO5	Construct Isometric Scale, Isometric Projections and Views.
			CO6	Convert Isometric to orthographic views and understand basic sketching using computer aided design (CAD) software.
		IC04 9HC04: ENGINEERING CHEMISTRY	C01	analyze microscopic chemistry in terms of atomic orbital's, molecularorbital's and intermolecular forces.
			CO2	Identify and differentiate polymers, thermoplastic, thermosetting plastics and variouslubricants.
I-II & A22	9HC04		CO3	Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
			CO4	interpret the important fundamental concepts of electrochemistry andsolve the problems related to batteries.
			CO5	Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques
			CO6	explainsynthesis of drug molecules and analytical

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			techniques like electronic, vibrational and rotational
		CO1	spectroscopyDesign the programs using structures, unions and enum
		CO2	Demonstrate the concepts of Abstract data type and also applications of stacks and queues
9EC01	9EC01 - DATA	CO3	Implement basic operations on single, double and circular linked list
	STRUCTURES	CO4	Solve problems involving Binary Search trees and AVL trees
		CO5	Articulate the concepts of graphs, heaps and hashing
		CO6	Develop algorithms for various searching and sorting techniques and analyze their performance
		C01	Find the limits and test for the continuity and differentiability of a function
	9HC12: ADVANCED	CO2	Solve the problems on multiple integrals
9HC12		CO3	Solve linear and nonlinear first order partial differential equations
JIIC12	CALCULUS	CO4	Find Series expansion a function defined over the intervals
		CO5	Find directional derivative, gradient, divergence and curl of a function
		CO6	Solve problems of line, surface and volume integrals
		C01	analyse the system of forces and draw free body diagrams to solve problems dealing with a system of forces in a plane
	9K201: Engineering	CO2	explain various types of friction and analyze and solve real world problems related to friction
9K201	Mechanics (For Civil Engineering)	CO3	explain the concepts and compute Center of gravity for various shapes
		CO4	explain the concepts and compute mass moment of Inertia for various regular and composite shapes and bodies to evaluate the strength of the body

			CO5	predict the geometry of motion of a particle and explain work energy, impulse momentum, virtual energy principles
			CO6	distringuish different motions of a rigid body in a plane and predict geometry of rigid body motion and compute forces in the body
			CO1	Prepare Inorganic compounds
			CO2	Determine surface tension of a liquid, viscosity of lubricant, and acid value of an oil
	9HC64	9HC64: ENGINEERING	CO3	Estimate hardness of water and Analyze the amount of chloride content
	511004	CHEMISTRY LAB	CO4	Determine cell constant and conductance of solutions, redox potential and emf of solutions, the rate constant of acid
			CO5	Synthesize a polymer (Thiakol rubber / Urea-Farmaldehyde resin), a drug- Aspirin
			C01	Write programs on structures and unions
		9EC61 - DATA EC61 STRUCTURES USING C LAB	CO2	Implement Stacks, Queues and circular queues using arrays
	9EC61		CO3	Write programs to implement basic operations on various types of linked list
			CO4	Implement insertion and traversal operations on binary search tree
			CO5	Develop programs on various searching, sorting algorithms
		9HC62- ORAL HC62 Communication LAB- II	CO1	demostrate the nuances of striking a great conversation in formal and informal situations
	9HC62		CO2	face an audience and speak in public
			CO3	Design a winning presentation and present it with ease
			C01	Use various types of conventional manufacturing Processes
	9BC61 WORKSHOP/MANU FACTURING PROCESSES LAB		CO2	Manufacture components from wood, MS flat, GI Sheet etc
95		CO3	manufacture components such as shafts, holes, and threaded holes by machining and surface finishing	

			CO4	Produce small devices / products /appliances by assembling different components
			C01	Solve problems on analyticity and conformal mapping
			CO2	Evaluate Series expansions of a function using Taylor's and Laurent's series and also evaluation of definite integrals and improper integrals
	8HC15	8HC15 - Complex analysis, Probability, and Statistics	CO3	Solve problems on probability and will able to solve problems on discrete and continuous probability distributions
			CO4	Describe basic concepts of sampling distribution and solve problems on estimation
			CO5	Solve problems on quality control
			CO6	define the test of hypothesis and solve problems based on the concept
	8K301	8K301 - Solid Mechanics	C01	evaluate the strength of concept of the stress and strain for different materials
II-I & A20			CO2	evaluate the behavior of different beams for Shear Force and Bending Moment diagrams
			CO3	valuate the behavior and strength of flexural stress, direct and bending stresses
			CO4	evaluate the deflection of beams subjected to various loads
			CO5	determine the Principal Stresses and Strains in the members subjected to stresses
			CO6	evaluate the Shear Stresses and Theories of Failure
			C01	Calculate angles, distances using chain and tape
	8K302	8K302 - Surveying and Geomatics	CO2,CO3	Identify data collection methods using a compass and enhance knowledge of the various field applications of levelling Apply the concepts of Trigonometric levelling
			CO4	Set out curves on the field and overcome obstructions in curve ranging

				apply the concepts of Remote
			CO5	sensing and GIS/GPS to Civil Engineering problems
			CO6	Read Aerial maps and perform necessary calculations
			C01	Identify different building materials and differentiate use them appropriately
			CO2	Test the various properties of cement and to use the appropriate admixtures
	8K303	8K303 - Building Materials and Planning	CO3	Identify the various mortars and check for its suitability in various jobs
		Materials and Planning	CO4, CO5	To effectively use new building materials and appropriate paints for the various works undertaken Appropriately suggest the different roof and floor types for different construction practices
			CO6	Plan construction activities in adherence with the bye-laws
			CO1	demonstrate the importance of certain soft skills like time management, goal setting and etiquette so that they can make their mark in their career and life in general
	8HC74	Soft Skills	CO2	sharpen their verbal ability to handle the competitive exams
			CO3	enhance their team skills and design thinking capabilities for effective problem solving and decision making
			CO4	know their emotional information which guides their thinking, behavior and helps them manage stress efficiently
			CO5	equip themselves with the prerequisites, and the relevant techniques to effectively tackle the corporate interview process in vogue
	8ZC02	Open elective - I: 8ZC02 – BASICS OF ENTREPRENEURSHIP	CO1	show basic knowledge on Skills of Entrepreneurship
			CO2	demonstrate the techniques of selecting the customers through the process of customer

			segmentation and Targeting
			segmentation and Targeting
		CO3	compare business Models and their validity
		CO4	explain the basic cost structure, Revenue Streams and the pricing strategies
		CO5	illustrate project management and its techniques
		CO6	choose marketing strategies and business regulations for Start ups
		CO1	list Python versions and their specifications and build programs
		CO2	Write applications that include functions, modules, packages along with respective exceptional handling mechanism
8FC22	Open elective - I: 8FC22 Python Programming	CO3	Write applications using OO features of Python and applications using Files
	and Computer Algorithms	CO4	interpret NumPy/Tkinter/Plotpy modules
		CO5	Analyze worst-case running times of algorithms using asymptotic analysis
		CO6	Describe the dynamic-programming paradigm and the greedy paradigm and explain when an algorithmic design situation calls for it
		CO1	make self-assessment
		CO2	explain the importance of certain soft skills like time management, goal setting and etiquette and how they make a mark in their career and life in general
8HC0	Universal Human Values	CO3	assess their emotional strengths which guides their thinking, behavior and helps them manage stress efficiently
		CO4	identify the prerequisites, and the relevant techniques in order to tackle corporate interview process in vogue
8K37	MECHANICS OF SOLIDS LAB	CO1,CO2	Conduct compression tests on spring, wood and concrete Conduct flexural and torsion test to determine elastic constants
		CO3	Determine hardness of metals
8K372	, SURVEYING	C01	Stake out/Lay out different types of curves in the field
013/2	LABORATORY	CO2	Use modern instruments such as Total Station and GPS for locating

				and plotting any/all ground features
				Course Outcomes of All the Subjects (AY 0-)
			C01	Make use of AutoCAD commands for drawing D building drawings
	8K373	COMPUTER AIDED DRAFTING OF BUILDINGS LAB	CO2	Create plans and sections for simple buildings
		BUILDINGS LAD	CO3	Present drawings in required format according to user requirements
			C01	Demonstrate public speaking with the aid of Power Point Presentations
	8K384	TECHNICAL SEMINAR –III	CO2,CO3	Identify current general and specific technological topics of interest and prepare and present the content cogently Demonstrate communication skills and interview performance skills
	8K394	Comprehensive Test and Viva Voce – III	CO1,CO2	recall the concepts in the core and elective courses Exhibit technical knowledge to face interviews
		viva voce – m	CO3	Exhibit lifelong Learning skills for higher education and to pursue Professional practice
			CO1	recall basics of Managerial Economics at Micro level, Demand analysis and production analysis in particular
		Economics, C01 Accountancy, and Management Science	CO2	define cost concept, Revenues and Market structure
II-II & A20	8ZC01		CO3	list various basic concepts of Accounting, Double entry system and Book keeping
			CO4	explain the concepts of Capital expenditure, Revenue expenditure and Final accounts
			CO5	outline the basics of Management, its principles and various functions performed in organization
			CO6	explain various personality traits, perception, attitudes of individuals

				working in organization
			CO1	evaluate the deformation of structures
			CO2	Describe the stability of structures under certain loading conditions
	8K404	Mechanics of Materials	CO3,CO4	assess the deformation for structures under load actions evaluate the force-stress equilibrium relationship in Multiaxial load condition
			CO5	evaluate the displacement-strain relationship in Multiaxial load condition
			CO6	solve the stress behavior pattern in thin cylinder and sphere
			CO1	Explain the properties of fluids and determine shear force on the surfaces applying newton's law of viscosity
	8K405	Fluid Mechanics	CO2	Compute hydrostatic forces on immersed and floating bodies and predict stability of floating bodies
			CO3	Apply laws of kinematics to fluid flow and arrive at D, D, D continuity equations
			CO4	Workout Eulers and Bernoullis equations for average flow along a streamline and apply these laws to measure fluid flow; understand principles of dimensional analysis to arrive at non dimensional quantities
			CO5	Workout equation for friction loss for flow through conduits and predict flow behaviour in pipe networks
			CO6	Apply the concept of boundary layer to fluid flow over solid bodies and assess its effects on these bodies
			CO1	quantify precipitation;
			CO2	estimate various abstractions of precipitation;
			CO3	estimate runoffs from given data;
	8K406	Hydrology and Water resources engineering	CO4	apply the knowledge of various water withdrawals and uses to practical problems;
			CO5	design basic water distribution systems;
			CO6	arrive at hydrologic design of spillways
	8K408	ENGINEERING GEOLOGY	CO1	Describe different concepts and terms used in Engineering

				Geology
			CO2	Identify and explain various types of minerals and rocks
			CO3	Apply the various concepts of Engineering Geology to civil engineering field
			CO4,CO5	Examine and select the sites related to dams, roads, tunnels and slopes Identify the hazards prior and able to take the necessary precautions
			CO6	list geological hazards
			C01	explain the concept of OOP with the need of constructing objects, and classes Write programs using classes, objects, members of a class and the relationships among them needed for a specific problem
		Open Elective - II: 8EC42- PROGRAMMING IN JAVA	CO2	Identify the purpose and usage of principles of inheritance and polymorphism Implement concepts of polymorphism, encapsulation and method overloading
8	8EC42		CO3	Create Java application programs using sound OOP practices (eg, interfaces and APIs) and proper program structuring (eg, by using access control identifiers, automatic documentation through comments)
			CO4	implement error exception handling and multi-threading
			CO5	create GUI for the specific applications
			CO6	Write programs for event- handling using various user interface components on applets
c	8ZC23	Open Elective – II 8ZC23- Advanced Entrepreneurship	C01	explain the stages of Startup and the turbulence environment it undergoes and the stages related to growth of the Startup
	02025		CO2	classify various business models and critically evaluate the effectiveness of the business models and products

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			CO3	define the method of business traction, create roles and build their A- team
			CO4	list various channels of revenue building and exploration of new revenue avenues
			C05	dissect the need of sales planning, people planning, and financial modeling
			CO6	explain legal implications affecting the company's prospects and identifying right mentors and advisors to support startups
-			C01	demonstrate ecosystem and energy flow among the organisms
			CO2	name resources available, and explain overexploitation of the resources in the nature
		Environmental Science and Ecology	CO3	summarize the value and use of biodiversity
	8HC05		CO4	list the causes and effect of pollution and implement measures in control of pollution
			CO5	explain the sustainable development and implement green technology for sustainable development
			CO6	implement policy to protect the environment
-	8K471	FLUID MECHANICS LAB	C01	Determine coefficient of discharge for orifice and mouthpiece
			CO2	Calibrate notches, venturimeter, orifice meters
			CO3	Determine major and miner losses in pipes
	8K472	ENGINEERING GEOLOGY LABORATORY	C01	Identify the various rocks and minerals depending on geological classifications
			C01	operate in the MATLAB environment using programming fundamentals
	8K473	MATLAB	CO2	write basic matlab programs using commands and functions
			CO3	write MATLAB programs for solving problems encountered in Civil Engineering
	8K485	TECHNICAL	CO1	Demonstrate public speaking with

		SEMINAR – IV		the aid of Power Point
				Presentations
			CO2,CO3	Identify current general and specific technological topics of interest and prepare and present the content cogently Demonstrate communication skills and interview performance skills
	8K495	COMPREHENSIVE VIVA VOCE – IV	CO1,CO2	Comprehend the concepts in the core and elective courses Exhibit technical knowledge to face interviews
			CO3	Exhibit lifelong Learning skills for higher education and to pursue Professional practice
	8K510	HYDRAULICS AND HYDRAULIC MACHINERY	CO1	Analyse uniform flows through open channels and work out resistance to the flow and most economical sections
			CO2	Analyse gradually varied flows through open channels and able to classify different profiles and compute profile lengths
			CO3	Workout sequent depths and energy dissipation of hydraulic jumps in open channels
			CO4	Arrive at the force generated on vanes and work done by vanes due to impact of jet on the vanes
III-I & A20			CO5	Compute work done by the turbines and able to arrive at hydraulic design of the turbines
			CO6	Compute work done by centrifugal and reciprocating pumps and able to prevent cavitation conditions in the pumps
			CO1	depict the various phases and fabric of soil
			CO2	determine the index properties and classify the soil
	8K511	SOIL MECHANICS	CO3	apply the concepts of water flow through soil in the context of design and construction of embankments, canals etc apply stress distribution and effective stress in soil for

				designing the foundation
				designing the roundation
			CO4	compute the compressibility of different types of soil
			CO5	draw the Mohr's circle and find out shear strength parameters of soil
			CO1	test cement and know cement applications
			CO2	assess aggregates and its properties
			CO3	assess fresh concrete and its behaviour on using admixtures
81	K615	CONCRETE TECHNOLOGY	CO4	evaluate and analyse behaviour of hardened concrete and testing of hardened concrete
			CO5	arrive at proportions for different mix-design of concrete using IS code books
			CO6	assess different types of concrete and its behaviour and applications
			CO1	explain basic requirements of concrete structures and fundamentals of different design philosophies
		(PROFESSIONAL ELECTIVE – I) 8KC51: REINFORCED CONCRETE DESIGN	CO2	interpret various specifications of relevant standards, to field problems and professional practices
81	KC51		CO3,CO4,CO5	design singly reinforced, doubly reinforced rectangular and flanged beams design slabs with different conditions and different supports design for uni-axial and biaxial bending of columns and design isolated square, rectangular and circular footings
			CO6	Interpret and communicate the design and detailing of rc beams, slabs, columns, stair cases and footings, through appropriate structural drawings
		(Open elective-III)	CO1	Explain Abstract data type, stack and Queues with their applications
81	EC44	8EC44: DATA BASE SYSTEMS CONCEPTS	CO2	Write programs on Singly linked lists, Doubly linked lists, Circular list and explain their operations
			CO3	Explain concepts of Trees, AVL

				Trees and Graphs with avamples and
				Trees and Graphs with examples and applications
				Describe and solve problems of
				searching and sorting and evaluate
		CO4	the time complexity of each	
				algorithm
				Explain concepts of OOPs and
			CO5	implement programs using objects,
				classes, constructors and destructors
				Explain and apply concepts of oops,
			CO6	write programs implementing
				functions, operator overloading and
				inheritance
			CO1	identify the basic concepts of a
				product
				distinguish the process of new
			CO2	product development and stages in
				the process
				illustrate the concept of product
			CO3	testing, product planning and the
		(Open elective – III) 8ZC24 - PRODUCT AND SERVICES		preparatory groundwork for
	8ZC24			launching a new product
				describe the nature of services,
			CO4	its differences with the goods and
				the application of marketing
				principles for services
				explain the attributes of a good
			CO5	service design and the tools for
				producing and distributing the
				services
				recognize the importance of
			CO6	quality of services and apply
				measurement scales to evaluate
				the service quality
			CO1	Interpret cyber-attacks, and
				outline types of cybercrimes
		CYBER SECURITY	CO2	explain cyber laws
	8FC24	(Mandatory course)		demonstrate how to protect
		(ivialidation y course)	CO3	themselves and ultimately the
	8K571		005	entire Internet community from
				cyber attacks
				compute Mannigs coefficient, 'n'
			CO1	for uniform flow in the open
				channel
		HYDRAULICS AND HYDRAULIC		determine work done by fluid jet
		MACHINERY LAB		on vane, compute work done and
		MACHINERILAD	CO2	draw performance characteristic
				curves for turbines and centrifugal
				pumps

		ГТ		
			CO3	perform hydraulic jump and verify sequent depths ration and energy loss
	8K572	SOIL MECHANICS LAB	CO1,CO2	determine basic engineering properties of soil classify the soil with the help of Atterberg's limits and Classification of soil
			CO3	determine the cohesion and friction using direct shear test and tri-axial tests
			CO1	Test Fineness, Specific Gravity, Setting Time, Soundness and Compressive Strength of Cement
	8K573	CONCRTE TECHNOLOCY LAB	CO2	Test Specific Gravity of Coarse Aggregate and Fine Aggregate, Bulking of Fine Aggregate
		TECHNOLOGY LAB	CO3	Design Concrete Mix Proportioning by Using Indian Standard Method
			CO4	Test Workability of Fresh Concrete and Compressive strength, Split Tensile Strength of Hardened Concrete
	8K577	GROUP PROJECT-I	C01	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects
			CO2	Exhibit the interest in learning the modern tools and technologies
			CO3	demonstrate enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs to the marked and society as a whole
			CO4	exhibit communication skills and team work skills
			CO5	Work as in individual and in a team
			C01	recall the concepts in the core and elective courses
	8K596	COMPREHENSIVE VIVA VOCE-V	CO2	Exhibit technical knowledge to face interviews
			CO3	Exhibit lifelong Learning skills for higher education and to pursue Professional practice

				avalain the fundamentals of
			CO1	explain the fundamentals of electrical engineering and DC machines
			CO2	define the principles of AC circuits
	8AC48	ELEMENTS OF ELECTRICAL & ELECTRONICS	CO3	explain the principle and operation of three phase induction motor and measuring instruments
		ENGINEERING	CO4	summarize the principle and operation of diode
			CO5	recall the principle and operation of transistor
			CO6	summarize the principles of digital electronics
			CO1	recall the basic definition of GIS
			CO2	generate various model from raw data
	8K613	GEOGRAPHIC INFORMATION SYSTEM	CO3,CO4,CO5	edit and rectify the topography data analyze and interpret the data generated apply GIS in Projects
III-II & A20			CO6	list out various spheres of application for Civil Engineers
	7K614	ENVIRONMENTAL ENGINEERING	CO1	design the treatment units based on the population estimation
			CO2	analyse a water supply network
			CO3,CO4,CO5	describe collection of sewage and treatment of sewage water distinguish basic phenomenon/ units involved in the treatment plants explain the basic treatment processes involved in treating water
			CO6	explain solid waste management and low cost treatment technologies
	8K717	Disaster Mitigation and Management	C01	analyze and critically examine existing programs in disaster management regarding vulnerability, risk and capacity at local, national and international levels
			CO2	choose the appropriate activities and tools and set up priorities to build a coherent and adapted disaster management plan
			CO3	explain various mechanisms and consequences of natural and human

				induced disasters for the participatory role of engineers in disaster management
			CO4	Develop an awareness regarding the chronological phases of disaster preparedness, response and relief operations for formulating effective disaster management plans
			CO5	list various participatory approaches/strategies and their applications in disaster management
			CO6	explain the concepts of remote sensing and geographical information systems for their effective application in disaster management
			C01	design various Steel Structures and connections and interpret the specifications of relevant codes
		DESIGN OF STEEL STRUCTURES (PROFESSIONAL ELECTIVE – II)	CO2	apply the design principles to field problems
	8KC61		CO3	apply design principles to field problems of tension members
			CO4	draw, understand and interpret the detailing aspects of steel structural drawings
			CO5	Is able to investigate into the critical issues of steel structures, compare various options and chose the best solution for the problems in the area of steel structures
			CO6	design the end bearing Stiffness and intermediate stiffness
			C01	contrast Python versions and their specifications
			CO2	Build programs using primitive data types
	8EC45	ARTIFICIAL ENGINEERING	CO3	Write applications that include functions, modules, packages along with respective exceptional handling mechanism
			CO4,CO5	Write applications using OO features of Python Write applications using Files
			CO6	develop NumPy/Tkinter/Plotpy modules

	8K671	GEOGRAPHICAL INFORMATION SYSTEMS LAB	CO1,CO2,CO3	extract various details from the topography survey map The student shall be able to convert the raw data into vector and raster forms The student shall be able to generate maps with various geographic features
	8K672	ENVIRONMENTAL ENGINEERING	CO1,CO2	establish water and wastewater quality, and know which tests are appropriate for given environmental problems? Statistically analyse and interpret laboratory results
		LABORATORY	CO3	use the water and wastewater sampling procedures and sample preservations
			CO4	Obtain the necessary background for subsequent courses in environmental engineering
	8AC95	ELECTRICAL & ELECTRONICS ENGINEERING LAB	CO1,CO2	Use Excel sheets for Civil Engineering applications Write computer programs for structures with various loading and support conditions using Civil Engineering related software such as STAAD Pro
		GROUP PROJECT-II	C01	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing small conceptual projects
			CO2	Exhibit interest in learning the modern tools and technologies
	8K678		CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs to the marked and society as a whole
			CO4	Improve their communication skills and team work skills
			CO5	Work as in individual and in a team
	8K697		CO1	recall the concepts in the core and elective courses
		K697 COMPREHENSIVE VIVA VOCE –VI	CO2	Exhibit technical knowledge to face interviews
			CO3	Exhibit lifelong Learning skills

				for higher education and to pursue
			CO1	Professional practice apply potential energy method to structural engineering problems
			CO2	generate and solve the governing FE equations for one-dimensional problems
	7K717	Finite Element Method for Civil Engineers	CO3	generate and solve the governing FE equations for two-dimensional problems
			CO4	formulate FE equations using four nodded iso-parametric element
			CO5	solve FEM equation using the Gauss quadrature
			CO6	analyze basic structural elements using ANSYS software
			CO1	design and detail Surplus weir;
			CO2	design and detail Direct sluice ;
	7K718	Design and Detailing of Hydraulic Structures	CO3,CO4,CO5	design and detail Glacis type canal drop; design and detail Cross regulator; Design of super passage
			CO6	design and detail and understand design concepts of syphon
IV-I & A18	7K719	Estimation and Valuation	CO1	prepare detailed estimates for different buildings
			CO2	do the rate analysis for different items of works of buildings
			CO3	prepare the rate analysis for different items of works
			CO4,CO5	prepare the schedules for shuttering and bar bending work out different types of contracts, prepare tenders, to suit the present day practices of tendering
			CO6	valuate buildings as per norms
	7KC74		C01	explain the necessity of ground improvement and the factors which decide the method of ground improvement
		Professional Elective_III(7KC74: Ground Improvement Techniques)	CO2	contrast mechanical modification of the ground by compaction and various methods of compaction
		Techniques)	CO3	outline hydraulic modification of the ground by lowering of water table and other methods
			CO4	Understand the necessity of

				drainage of slopes, vertical drains sand drains etc,
				Understand chemical
				modifications of the ground by
		CO5	lime stabilization and other	
		-		methods
			CO6	Understand the method of grouting
				and other advanced methods
			CO1	Identify the implementation layers of an IoT application system
				Summarize the characteristics and
			CO2	challenges of designing SDN and
				NFV
		Open elective_III	CO3	Describe the management of an IoT
	7DC55	(7DC55) Internet of	663	system using necessary protocols
	10000	Things		Design, Develop and Illustrate IoT
		1 milligo	CO4	applications using Raspberry PI
				platform and Python Scripting
			CO5	Implement web based services on
				IoT devices
			CO6	Design new projects using Raspberry PI
				The students gain the knowledge
				on the inputs required for
			CO1	
				innovation and also gain
		-		familiarity on Entrepreneurship
				The students will get exposure on
			CO2	creative methods of ideation and
				the importance of protecting the
				ideas
		Open elective_III		The students gain knowledge on
	7ZC24	(7ZC24) Innovation and	CO3	design thinking and types of
		Design thinking		thinking
		[		The students gain familiarity on
			CO4	emerging technologies like
				Internet of things (IOT)
				The students understand the
			CO5	process of building the startup
		-		The students gain knowledge on
			<b>CO</b> (	• •
			CO6	various startup funding and also to
				branding building for the startup
				Test Fineness, Specific Gravity,
			CO1	Setting Time, Soundness and
				Compressive Strength of Cement
	712771	Concrete Technology		Test Specific Gravity of Coarse
	7K771	Lab	CO2	Aggregate and Fine Aggregate,
				Bulking of Fine Aggregate
		Γ		Design Concrete Mix
			CO3	Proportioning by Using Indian
		1		

				Standard Method Test Workability of Fresh Concrete and Compressive strength, Split Tensile Strength of
			CO4	Hardened Concrete
	7K772	Revit Lab	C01	Develop the architectural design for the structure based on the requirement of end user
	/11//2	Kevit Lab	CO2	Develop the design and documentation for the various structures using REVIT software
		Estimation & Quantity	C01	Use Excel sheets for Civil Engineering applications
	7K773	Estimation & Quantity Surveying Laboratory	CO2	Develop the documentation for material quantities and rate analysis for different structures
			C01	review and outline various civil engineering problems that can be taken up as project work
			CO2	Work in a team to select a problem for project work
		Project - I	CO3	Review and evaluate the available literature on the chosen problem
			CO4	formulate, with the help of faculty advisor, a methodology to solve the identified problem
			CO5	Apply the principles, tools and techniques to solve the problem
			CO6	Prepare and present project report
		Artificial Intelligence - Mandatory course	CO1	explain significance of AI list out different types of AI agents and AI search algorithms infer fundamentals of knowledge representation build simple knowledge-based systems
IV-II & A18	7KC81 Elective_IV Structural I	Professional Elective_IV(7KC81: Structural Engineering) -	CO2,CO3	Differentiate between statically determinate and indeterminate structures Sketch the SF and BM diagrams for determinate and indeterminate beams Calculate the deflections in beams and frames
		studied in III-I	CO4	draw the SFD and BMD for structures with and without sway
			CO5	Aanalyse the indeterminate structure for various types of loads

			CO6	analyze the truss and also able to determine the Plastic moment capacity of a structure
		Professional	CO1	recall soil exploration methods
			CO2	calculate earth pressures on foundations and retaining structures
		Elective_V(7KC86:	CO3	Analyse shallow foundations
	7KC86	Foundation Analysis and Design - studied in III-	CO4	determine bearing capacity of soils and foundation settlements
		II)	CO5	Design the Pile foundation
			CO6	illustrate the concept of well foundation
		Project - II	C01	review and outline various civil engineering problems that can be taken up as project work
			CO2	Work in a team to select a problem for project work
			CO3,CO4	Review and evaluate the available literature on the chosen problem formulate, with the help of faculty advisor, a methodology to solve the identified problem
			CO5	Apply the principles, tools and techniques to solve the problem
			CO6	Prepare and present project report



### Course Outcomes of EEE Department

SREENIDHI INSTITUTE OF





#### Department of Electrical & Electronics Engineering COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and regulation	Course code	Course name	Co's		
			CO1	Explain semiconductor behavior, types and their applications	
			CO2	Differentiate the wave and particle, and its application for a particle in one dimension box	
	9HC07		CO3	Explain about emission, its types, laser principle and applications of optical fibers (sensors and medical endoscopy)	
	9HC07	Engineering Physics	CO4	Reveals about the magnetism-its origin and types and its applications	
			CO5	Explain the basic concepts of dielectric materials, polarization and its types, their applications (piezo, ferro and Pyro electricity).	
			CO6	Summarize nano& bulk concepts, surface to volume ratio and its applications.	
			CO1	Explain basic fundamentals of Computer Systems, computing environments, Computer Languages – Machine Languages.	
	9FC01	Problem Solving using C	CO2	Describe C language Programs, Structure of a C Program	
			CO3	Describe write programs using control structures such as Pre-test and post-test loops, while, do while, for, break	
I-I & A22			CO4	Write programs implementing application on arrays	
			CO5	Write programs using Pointers and string handling functions	
			CO6	Write programs using Enumerated, Structure, Union types and files.	
			CO1	Basic operation of matrices and about the linear system and some analytical methods for solution.	
			CO2	Concept of Eigen value and Eigen vector and their properties and applications.	
			CO3	Quadratic form and its properties.	
	9HC11	MATRIX ALGEBRA AND CALCULUS	CO4	Mean value theorems and their applications to the given functions, series expansions of a function.	
			CO5	Various analytical methods to solve first order first degree and also the equations not of first degree ordinary differential equations.	
			CO6	Methods to solve higher order ordinary differential equations.	
	9HC01	Essential English	CO1	Demonstrate competence with suitable accuracy in vocabulary, and language fluency.	

r			
	Language Skills (EELS)	CO2	State the definition of nouns, verbs, adjectives, and adverbs.
		CO3	Identify the differences of each tense and use the tenses accurately.
		CO4	Identify specialized reading strategies for specific types of texts
		CO5	Produce written work that is substantive, organized, and grammatically accurate.
		CO1	Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
		CO2	Understand and Implement Orthographic projections and draw projections of simple drawing entities such as points Lines, and Planes
9BC0	1	CO3	Draw projections of different types of regular solids in various positions wrt principal planes of projection
	Engineering Graphics	CO4	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
		CO5	Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views
		CO6	Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software
		CO1	Describe people, objects and situations using simple sentences.
		CO2	Use appropriate tenses and expressions in different contexts of conversations.
9НС6	1 Oral Communication Lab-I	CO3	Identify major areas of concern in their oral communication and address them.
		CO4	Create a SMART plan to enhance their communication skills in English
		CO1	Demonstrate the wave length of monochromatic source of light by using Newton's Rings
		CO2	Analyze refractive index of a material prism and Dispersive power of a glass Prism by using spectrometer
9HC6	6 Engineering Physics Lab	CO3	Determine the wave length of spectral light and laser Source of light by using Diffraction Grating
		CO4	Design and Analyze RC Circuits
		CO5	Analyze RLC Series circuit and parallel circuit
		CO6	Investigate magnetic Circuits
9FC6	1	CO1	To formulate the algorithms for simple problems

		Problem Solving using C Lab	CO2	To translate given algorithms to a working and correct program
			CO3	To be able to correct syntax errors as reported by the compilers
			CO4	To be able to identify and correct logical errors encountered at run time
			CO5	To be able to write iterative as well as recursive programs
			CO6	To be able to represent data in arrays, strings and structures and manipulate them through a program
I-II & A22			CO1	To understand microscopic chemistry in terms of atomic and molecular orbitals
			CO2	To learn the preparation and applications of commercial polymers and lubricant materials
		ENGINEERING	CO3	To learn the industrial problems caused by water and municipal water treatment
	9HC04	CHEMISTRY	CO4	To acquire knowledge about different types of batteries and their working mechanism
			CO5	To develop the concepts and types of corrosion and the factors influence corrosion
			CO6	To understand the control methods and protective coatings for metals and other surfaces
			CO1	Apply Kirchhoff's laws for solving electrical circuits.(L3)
		A201 ELECTRICAL CIRCUITS AND NETWORKS – I	CO2	Construct the network graph and solve the problems of electrical networks. (L3)
	9A201		CO3	Solve the problems of composite magnetic circuits and electrical networks using network theorems. (L3)
			CO4	Explain the basic concepts of single phase AC circuits and solve the problems related to steady state analysis. (L2)
			CO5	Evaluate various parameters such as Q factor and bandwidth for resonance circuits. (L5)
			CO1	Design the programs using structures, unions and enum.
		DATA STRUCTURES	CO2	Demonstrate the concepts of Abstract data type and also applications of stacks and queues.
			CO3	Implement basic operations on single, double and circular linked list.
	9EC01		CO4	Solve problems involving Binary Search trees and AVL trees.
			CO5	Articulate the concepts of graphs, heaps and hashing.
			CO6	Develop algorithms for various searching and sorting techniques and analyze their performance.
	9HC12	ADVANCED CALCULUS	CO1	Basic concepts of multivariable differential calculus.

			CO2	Evaluation of double and triple integrals.
			CO3	Solutions of first order linear and non-linear partial differential equations.
			CO4	Series expansion of a given function in terms of sine and cosine terms.
			CO5	Basic Concepts of vector differential calculus.
			CO6	Concepts of vector integral calculus,
			CO1	Understand the nuances of striking a great conversation in formal and informal situations.
	9HC62	Oral Communication Lab- II	CO2	Gain experience of facing an audience and speaking in public.
			CO3	Design a winning presentation and present it with ease.
	9HC64	Engineering Chemistry Lab	CO1	Describe the principle and theory in determination of Hardness of a water sample.
	90004	Lab	CO2	Experiment the method of preparation for organic compounds.
	9EC61	Data Structures Using C Lab	CO1	Write programs on structures and unions.
			CO2	Implement Stacks, Queues and circular queues using arrays.
			CO3	Write programs to implement basic operations on various types of linked list.
			CO4	Implement insertion and traversal operations on binary search tree
			CO5 CO6	Develop programs on various searching, sorting algorithms.
	9BC61	Workshop/Manufacturing Processes Lab	CO1	Use various types of conventional manufacturing Processes
			CO2	Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience
			CO3	Manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.
			CO4	Produce small devices / products /appliances by assembling different components
		TRANSFORM TECHNIQUES AND 14 NUMERICAL METHODS	CO1	Use the Laplace transforms techniques for solving ODE's
II- I A-20	8HC14		CO2	Use the Z-Tranforms technique for solving Difference equations
			CO3	Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations.
			CO4	Find the root of a given equation.
			CO5	Estimate the value for the given data using interpolation

[			CO6	Find the numerical solutions for a given ODE's
	8CC02	DIGITAL LOGIC DESIGN	CO1	An ability to understand number systems and apply the rules of Boolean algebra and K-maps to simplify Boolean expressions.
			CO2	An ability to design MSI combinational circuits such as full adders, multiplexers, decoders, encoders, Code converters.
			CO3	An ability to design basic memory units (latches and flip-flops) and sequential circuits such as counters and registers
			CO4	An ability to design digital design using PLD's such as ROM's, PLA's, PALs and digital controllers using Algorithmic State Machine Charts.
			CO1	Demonstrate the concepts of pn Diode, Zener Diode, Bipolar Junction Transistor, Field Effect Transistor and their characteristics.
	0.0.001	ELECTRONIC	CO2	Design and Analyze the Amplifier circuit's using BJT and FET.
	8CC01	DEVICES AND CIRCUITS	CO3	Classify and characterize the Feed Back amplifiers and design various Oscillator circuits.
			CO4	Understand the Basic regulator circuits and voltage multipliers.
	8A302	ELECTRO MAGNETIC FIELDS	CO1	Understand the Principle of electrostatics.
			CO2	Understand the principle of dipole and field due to dipole.
			CO3	Understand the Fundamentals of dielectrics and calculation of capacitance.
			CO4	Understand the Fundamentals of Ampere circuital law and force in magnetic field.
			CO5	Understand the magnetic dipole and magnetic potential.
			CO6	Understand the self and mutual inductance and time varying fields.
		ELECTRICAL MACHINES – I	CO1	Understand the Electromechanical Energy conversion.
			CO2	Understand the constructional features & Principle of operation of DC machine.
	8A303		CO3	Understand the characteristic features of DC machines.
			CO4	Understand the starting & speed control techniques of various types of DC motors.
			CO5	<ul><li>Analyze the various testing procedures of DC machines.</li><li>Understand the various applications of DC</li></ul>
			CO6	machines.
		ELECTRICAL	CO1	Understand the three phase circuits.
	8A304	8A304 CIRCUITS and NETWORKS- II	CO2	Understand the DC and AC transients.
	-		CO3	Understand the network functions.
			CO4	Analyze the network parameters.

			CO5	Understand the different types of filters.
			CO5	Understand the Fourier analysis of AC circuits.
			000	Understand the concept of OOP with the need
				of constructing objects, and classes. Write
			CO1	programs using classes, objects, members of a
			001	class and the relationships among them needed
				for a specific problem.
				Identify the purpose and usage of principles of
				inheritance and polymorphism. Implement
			CO2	concepts of polymorphism, encapsulation and
				method overloading.
	00040	PROGRAMMING IN		Create Java application programs using sound
	8EC42	JAVA		OOP practices (e.g., interfaces and APIs) and
			CO3	proper program structuring (e.g., by using
				access control identifiers, automatic
				documentation through comments)
			CO4	Students understand and implement error
			0.04	exception handling and multi- threading.
			CO5	Students learn to create GUI for the specific
				applications.
			CO6	Write programs for event-handling using
				various user interface components on applets.
	8HC05	ENVIRONMENTAL SCIENCE AND ECOLOGY	CO1	To understand structure and function of
				ecosystem To learn classification and uses of natural
			CO2	
				To learn about Understanding the impacts of
			CO3	developmental activities and mitigation
				measures.
			004	To know the source, causes and preventive
			CO4	methods of pollution
			CO5	To understand the importance of ecological
				balance for sustainable development.
			CO6	To understand the environmental policies and
			00	regulations
			CO1	Understand color coding, operations on Diode,
				BJT, FET and other electronic components.
		ELECTRONIC	CO2	Correlate theoretical concepts with practical
		DEVICES & CIRCUITS		implementation.
	8CC71	LAB		Apply the knowledge of Diodes, Capacitors
			CO3	and Transistors for the realization of rectifiers,
				regulators, amplifiers and Oscillator circuits.
			CO4	Adapt effective Communication, presentation and report writing skills.
	94271	ELECTRICAL CIRCUITS AND NETWORKS ANALYSIS LAB	CO1	Perform the test for verification of various
				network theorems
			CO2	Measure the frequency for a RLC
	8A371			series/parallel circuits under resonance. Conduct an experiment for determination of
			CO3	self & mutual inductance and coefficient of
				coupling
			l	couping

	1	1		
			CO4	Construct current locus diagram by performing a test on single phase parallel circuits
			CO5	Simulate for analysis of electrical circuits.
			CO6	Determine the parameters of the coil
			CO1	Deliver lecture on emerging technologies.
		TECHNICAL SEMINAR – III	CO2	Explain domain knowledge to resolve real time technical issues
	8A393		CO3	Demonstrate ability to lead and explain concepts and innovative ideas.
	011375		CO4	Demonstrate team leading qualities.
			CO5	Demonstrate public speaking skills.
				Exchange new information that would not
			CO6	have been available otherwise.
		COMPREHENSIVE TEST AND VIVA VOCE	CO1	Comprehend the concepts in the Core Courses $1^{st}$ year and $2^{nd}$ year $1^{st}$ Semester.
	8A383	- III	CO2	Assess technical knowledge to face interviews.
			CO3	Exhibit lifelong learning skills to pursue higher studies or professional practice.
II- II A-20			CO1	Solve the random variable problems and probability distributions.
	8HC16	PROBABILITY & STATISTICS	CO2	Estimate the parameters and solve the problems using central limit theorem.
			CO3	Test the hypothesis related to samples concerning to the means and proportions of large size samples.
			CO4	Apply and solve the problems using t-test, Chi-square test also testing the hypothesis problems on small size samples, goodness of fit and independence of attributes.
			CO5	Solve the problems on measures of central tendency, Correlation and regression models
			CO1	Learn basic concepts of single phase transformer.
			CO2	Study about testing of single phase transformer and auto transformer.
	Q A 405	ELECTRICAL MACHINES H	CO3	Study about poly phase transformer.
	8A405	MACHINES-II	CO4	Study about poly phase induction motors.
			CO5	Study about torque speed characteristics and circle diagram of induction motor.
			CO6	Study about different starting methods of induction motor.
			CO1	Learn basic concepts of hydro electric and thermal power plants.
			CO2	Study about gas and nuclear power plants.
	8A406	POWER SYSTEMS - I	CO3	Study about transmission line parameters and efficiency.
			CO4	Study about performance of transmission lines.
			CO5	Learn basic about over head insulators and mechanical design.
			CO6	Learn fundamentals of underground cables.

			CO1	Learn basic concepts of control systems.
			CO1 CO2	Study about time response analysis.
	8AC07			Learn basic concepts of stability and root locus
		LINEAR CONTROL	CO3	method.
		SYSTEMS	CO4	Study about frequency response analysis.
			CO5	Learn basic concepts stability analysis in
				frequency domain.
			CO6	Learn fundamentals of state space analysis.
			CO1	Distinguish between small and large signal amplifier and able to compare the conversion
			COI	efficiency levels
			<i></i>	Analyze and Design tuned RF amplifiers and
			CO2	different types of sweep generators
	8CC05	ANALOG CIRCUITS		Understand linear and non-linear wave shaping
			CO3	methods and able to Analyze various types of
				Logic gates and Sampling gates.
			CO4	Understand and design various types of multivibrators and applications
			CO1	Students will learn basics of databases and understand the architecture of database
			COI	management systems.
	8EC44	DATABASE SYSTEMS CONCEPTS	~ ~ •	Students will learn about good database design
			CO2	techniques and database theories behind.
			CO3	Understand conceptual database designs, and
				functional dependencies and normalization.
			CO4	Students will understand the Mathematical
				foundation for relational databases. Student will be able to understand concept of
			CO5	Constraints, Views and will be able to create
				dynamic databases.
			CO6	Learn transaction management, concurrency
				controls.
			CO1	Development of a holistic perspective based on self-exploration about themselves (human
			COI	being), family, society and nature/existence.
		UNIVERSAL HUMAN		Understanding (or developing clarity) of the
	8HC17	VALUES (UHV)	CO2	harmony in the human being, family, society
			~~~	and nature/existence
			CO3	Strengthening of self-reflection.
			CO4	Development of commitment and courage to act.
			CO1	Assess them using SWOT analysis.
				Appraise the importance of certain soft skills
	8HC03		CO2	like time management and goal setting.
			CO3	Improve their verbal ability to handle the
		SOFT SKILLS	005	competitive exams.
			COA	Enhance their team skills and design thinking
			CO4	capabilities for effective problem solving and decision making.
			~~~	Know their emotional quotient which guides
1			CO5	their thinking, behavior and helps them

				manage stress efficiently.
				Equip themselves with the prerequisites, and
			CO6	relevant techniques to effectively attend
			000	corporate interviews.
			001	Understand the principles of DC electrical
			CO1	machines.
		ELECTRICAL	CO2	Understand the load characristics.
	8A473	MACHINES LAB – I	CO3	Understand the principle and operation of DC
			005	machine speed control methods.
			CO4	Understand the calculation of losses in DC
			04	machines.
				To understand the design and working of
			CO1	various linear and non-linear wave shaping
				circuits.
			000	To demonstrate the working principle of
			CO2	various multivibrators and functionalities of
	8CC74	Analog Circuits Lab		various logic gates. To perform and verify the working of
			CO3	oscillators, feedback amplifiers and voltage
			200	regulators.
				To perform laboratory experiment to verify the
			CO4	conversion efficiency of various power
				amplifiers.
			CO1	Deliver lecture on emerging technologies.
			CO2	Explain domain knowledge to resolve real time
		TECHNI	02	technical issues
			CO3	Demonstrate ability to lead and explain
		CAL SEMINAR -		concepts and innovative ideas.
	8A494	IV	CO4	Demonstrate team leading qualities.
			CO5	Demonstrate public speaking and lifelong learning skills for higher studies and to pursue
			005	professional practice.
				Exchange new information that would not have
			CO6	been available otherwise.
			CO1	Comprehend the concepts in the Core Courses
	0 4 40 4	COMPREHENSIVE		1 <sup>st</sup> year and 2 <sup>nd</sup> year.
	8A484	VIVA TEST – IV	CO2	Assess technical knowledge to face interviews.
			CO3	Exhibit lifelong learning skills to pursue higher
				studies or professional practice.
III-I & A20				Demonstrate the concepts of Differential
			CO1	Amplifier and Operational Amplifier and their
			966	characteristics.
			CO2	Design the basic circuits using IC 741 op-amp.
	8CC07 IC APPLICATIONS	IC APPLICATIONS	CO3	Explore, design and analyze active filters, timers, oscillators, voltage controlled oscillator
		005	DACs and ADCs, and IC regulators.	
				Classify and characterize the TTL/ECL/CMOS
			CO4	Logic Families and design of various logic
				gates using them.
	8A508	ELECTRICAL	CO1	Explain the constructional details and

	MACHINES - III		generation of EMF.
		CO2	Explain the causes for harmonics and its
		02	suppression and also armature reaction.
		CO3	Evaluate the performance of alternator by
			different methods.
		CO4	Explain how to operate the alternators in parallel for load sharing and how to control the
		04	reactive power.
		CO5	Analyze and explain applications of synchronous motor.
		CO6	Explain the various applications of single phase induction motor and special purpose motors.
		CO1	Understand the construction and operation of various power semiconductor devices and analyze about the series and parallel operation of SCRs.
		CO2	Analyze the operation of different configurations of single phase converters for different loads.
8A509	POWER ELECTRONICS	CO3	Analyze the operation of different configurations of three phase converters for different loads.
		CO4	Explain the operation of different type's choppers.
		CO5	Explain the operation of inverter and applications of inverters.
		CO6	Explain the working of an AC voltage controller and Cyclo-Converters for different configurations.
		CO1	Understand the importance of power factor and analyze the different methods of power factor and voltage control.
		CO2	Analyze the factors affecting the economic aspects of power generation and tariff, different methods of tariff.
8A510	POWER SYSTEMS-II	CO3	Learn about components of substation and different methods of grounding.
	OPERATING SYSTEMS CONCEPTS (OPEN ELECTIVE-I)	CO4	Learn about per unit system and symmetrical fault analysis.
		CO5	Learn about symmetrical components, sequence impedances and unsymmetrical fault analysis.
		CO6	Analyze different types of distribution systems.
		CO1	Describe the basic functionalities and structure of the Operating System
8EC76		CO2	Explain the concepts and implementations of: Processes, Process Scheduling. Describe, contrast and compare various types of Operating systems like Windows and Linux.
		CO3	Comprehend the concepts of Synchronization and Deadlocks in the Operating System

		CO4	Discuss the concepts of Memory Management
			(Physical and Virtual memory)
		CO5	Explain the concepts of File System with regard to directory and disk management algorithms.
		CO6	Students understand the concepts of I/O systems, protection and security in a case study given
		CO1	To understand the basics of Managerial Economics at Micro level
		CO2	To understand cost concept
	ECONOMICS,	CO3	To understand and identify various basic concepts of Accounting
8ZC0	ACCOUNTACY, AND MANAGEMENT SCIENCE (EAMS)	CO4	To understand the concepts of Capital expenditure
	SCHENCE (EAMS)	CO5	To make student understand the basics of Management
		CO6	To make student learn about various personality traits
		CO1	The students will be able to understand cyber- attacks, types of cybercrimes.
		CO2	Realize the importance of cyber security and various forms of cyber attacks and countermeasures.
		CO3	Get familiar of cyber forensics.
8FC2	4 CYBER SECURITY	CO4	Get familiar with obscenity and pornography in cyber space and understand the violation of Right of privacy on Internet.
		CO5	Cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
		CO6	Elucidate the various chapters of the IT Act 2008, power of Central and State Government to make rules under IT Act 2008.
		CO1	An ability to explore the applications of IC 741 OP-AMP.
	IC APPLICATIONS	CO2	An ability to design Active filters and its applications
8CC7	LAB	CO3	An ability to understand and implement generate square and Triangular waveforms using 555 Timers
		CO4	An ability to design D to A converters and its applications
	LINEAR CONTROL	CO1	To explore the applications of control systems.
8A57	SYSTEMS AND SIMULATION LAB	CO2	To explore the concepts of control systems.
8A58	5 SUMMER INDUSTRY INTERNSHIP – I	CO1	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
		CO2	Exhibit the interest in learning the modern

			[	tools and toologies through the 1 '1
				tools and technologies through the bridge
				courses arranged in the college, beyond the
				curriculum, and hence developing the software.
				Inculcate an enthusiasm to use the creative
			CO3	ideas to build the innovative projects and
				prototypes which are meeting the current needs
				of the market and society as a whole.
			CO4	Improve their communicative skills and team
				skills largely improve.
III-II &			CO1	Understanding the concepts of 8086
A20			001	Architecture
		MODODDOCESSOD	CO2	Understanding the concepts of Instruction set & developing skills in writing assembly language programs.
	8DC05	MICROPROCESSOR AND MICROCONTROLLER	CO3	Ability to interface keyboard, stepper motor ADC, DAC to 8086 using 8255
		S S	CO4	Understanding the concepts of 8051 Architecture
			CO5	Exploring the concepts of instruction set of 8051
			CO6	Ability to interface LED, LCD, Keyboard DAC, ADC with 8051
			CO1	Understand about power system transients and its effects.
			CO2	Learn about protection against over voltages.
	8A611	SWITCH GEAR AND PROTECTION	CO3	Learn about different types of circuit breakers and its importance.
	0A011		CO4	Learn about different types of electromagnet relays.
			CO5	Learn about different types of static relays.
			CO6	Learn about generator, transformer and feeder protection.
			CO1	Understand the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. The student demonstrates the ability to compensate for the errors in the instruments and to extend the range of the instruments.
	8A612 MEASUREMENTS & INSTRUMENTATION	CO2	Demonstrates the knowledge of Potential and Current transformers; the errors in them and the effect of having an open/short in the secondary circuits; Understand the principle of operation of Dynamometer and Moving-iron type of Power factor meters.	
		CO3	Comprehends the principle of operation of dynamometer type of Wattmeter and Induction type of Energy meter; use the wattmeter to measure the Active and Reactive power and demonstrates the ability to extend the range of them.	

		CO4	Identify and use different techniques of measurement of Resistance, Inductance and Capacitance values.
		CO5	Understand the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers and Cathode ray Oscilloscope.
		CO6	Demonstrates the ability in characterizing the different types of transducers and uses them to measure Strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque and Temperature.
		CO1	To acquire the knowledge of basic concepts of thermodynamics and analyze the p-v & t-s diagrams of the different cycles.
		CO2	To acquire the knowledge two and four stroke engines, the function of components used in the steam power plant
8BC	ELEMENTS of 8BC04 MECHANICAL ENGINEERING	CO3	To identify & understand the function of components used in VCR & VAR system, & about the working of hydraulic pumps & hydraulic turbines.
		CO4	To identify & understand properties of material and engineering application
		CO5	To acquire the knowledge of various types of power transmission systems
		CO6	To acquire the knowledge the different NC and CNC machine.
		CO1	Gains exposure towards Python versions and their specifications.
		CO2	Build programs using primitive data types.
8FC:	PYTHON 2 PROGRAMMING	CO3	Write applications that include functions, modules, and packages along with respective exceptional handling mechanism.
	CONCEPTS	CO4	Writes applications using OO features of Python
		CO5	Write applications using Files.
		CO6	Hands on exposure on NumPy/Tkinter/Plotpy modules.
		CO1	The Students' gain knowledge on the stages of Start-up and the turbulence environment it undergoes and the stages related to growth of the Start-up.
8ZC2	8ZC23 ADVANCED ENTREPRENEURSHIP (OPEN ELECTIVE – II)	CO2	The Students are exposed to the various business models and critically evaluating the effectiveness of the business models and products
		CO3	The students understand the method of business traction, create roles and build their A- team
		CO4	The students understand the various channels of revenue building and exploration of new

				revenue avenues.
				The students understand the need of sales
			CO5	planning and people plan and also financial modeling.
			CO6	The students are exposed to the legal implications affecting the company's prospects and identifying right mentors and advisors to support start-ups
			CO1	Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
			CO2	Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.
	8E654	ARTIFICIAL INTELLIGENCE	CO3	Learn different knowledge representation techniques.
			CO4	Understand the concepts of state space representation, exhaustive search, and heuristic search together with the time and space complexities.
			CO5	Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.
			CO6	Analyze Supervised Learning Vs. Learning Decision Trees
		POWER	CO1	Correlate theoretical and practical analysis of AC-AC
	8A678	ELECTRONICS AND SIMULATION LAB	CO2	Also analyze the characteristics of MOSFET.
	04 (77	ELECTRICAL	CO1	Understand the concepts studied in theory subject.
	8A677	MACHINES LAB – II	CO2	Understand the applications of the concepts.
			CO1	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
	8A696 GROUP PROJE		CO2	Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
		GKOUP PROJECT	CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
			CO4	Improve their communicative skills and team skills largely improve.
			CO5	Work as an individual and in a team.
	8A686	COMPREHENSIVE	CO1	Assess the relevant courses they have

		VIVA- VOCE		undergone till the completion of that academic
			CO2	year. Comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills.
IV- I A-18			CO1	Understand about importance of network matrices and usefulness in power system analysis.
			CO2	Analyze the power system under different types of faults.
	7A714	POWER SYSTEM ANALYSIS AND CONTROL	CO3	Analyze the power system under steady state condition for voltage and power flow calculations.
			CO4	Analyze the power system for maintain constant frequency in single area.
			CO5	Analyze the power system for maintain constant frequency in two area.
			CO6	Analyze the power system for maintaining steady state and transient stability.
		7A716 UTILIZATION OF ELECTRICAL ENERGY (PROFESSIONAL ELECTIVE – I)	CO1	Know the importance of different type of electric drives, selection of motor based on starting and running characteristics, required speed control, tolerance of temperature rise, Particular applications of electric drives, and understands different types of industrial loads, Continuous, Intermittent and variable loads etc
			CO2	Know the importance of advantages and methods of electric heating, and applications of resistance heating induction heating and dielectric heating.
	7A716		CO3	Identify the core areas of illumination, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere, and their applications & sources of light.
			CO4	Differentiate Discharge lamps of MV and SV lamps, tungsten filament lamps and fluorescent tubes, understands basic principles of light control, Types and design of lighting and flood lighting.
		CO5	Understands System of electric traction and track electrification.	
			CO6	Understand and Calculations of tractive effort, power, specific energy consumption for a given run, effect of varying acceleration and braking retardation, adhesive weight and coefficient of adhesion.
	7A715	RENEWABLE ENERGY SOURCES (PROFESSIONAL ELECTIVE – II)	CO1	Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms

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				describing the different angles that one
				may incur in setting up a solar panel and be
				able to use the instruments for measuring solar
				radiation.
			CO2	Demonstrates the knowledge of different
				techniques of solar collection and storage. The student becomes familiar with the different
				types of horizontal and vertical axis wind mills and understands the performance
			CO3	characteristics of the same. The student also
			005	demonstrates the knowledge of different
				Bio-gas digesters and factors influencing its
				yield.
				Aware of the potential of geothermal energy in
			CO4	India and will be able to characterize different
				types of geothermal wells.
				Aware of the different methods of kinetic
			CO5	energy extraction from Ocean waves and tides
			COS	and thermal energy extraction from
				Oceans.
				Demonstrates the knowledge of Direct Energy
			CO6	Conversion in different phenomena viz., Joule
				Thomson effect, Seebeck effect, Peltier effect
				etc. and the principle of operation of Fuel
				Cells.
				Identify the necessity of drive; understand the operation of different converters connected to
			CO1	D.C separately excited motors and series
				motors derive the Speed.
			CO2	Understand four Quadrant operations of dc
				drives and analyze electric braking.
		POWER SEMI	CO3	Understand four Quadrant operations of
		CONDUCTOR DRIVES	005	Chopper fed dc drives.
	7A713	(PROFESSIONAL		Describe the operation of Induction motor with
		ELECTIVE – III)	CO4	its equivalent circuit, speed control of
				Induction motor with V/ F control and its speed
				torque Characteristics
			CO5	Explain the concept of slip power and deduce an expression for speed variation with slip
			005	power
				Analyze the working of different Synchronous
			CO6	Motor drives.
				Students will learn basics of databases and
		CO1	understand the architecture of database	
			management systems.	
		7FC23 Data Base Systems (Open Elective – III)	CO2	Students will learn about good database design
	7FC23		02	techniques and database theories behind.
	/FC25 Elective – III)	CO3	Understand conceptual database designs, and	
			functional dependencies and normalization.	
		CO4	Students will understand the Mathematical	
1			foundation for relational databases.	
			CO5	Student will be able to understand concept of

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				Constraints, Views and will be able to create dynamic databases.
			CO6	Learn transaction management, concurrency controls.
			CO1	Develop plans with relevant people to achieve the project's goals
			CO2	Break work down into tasks and determine handover procedures
			CO3	Identify links and dependencies, and schedule to achieve deliverables
	7A779	PROJECT - I	CO4	Estimate the human and physical resources required, and make plans to obtain the necessary resources
			CO5	Allocate roles with clear lines of responsibility and accountability with team spirit.
			CO6	Design and develop the software or prototype to meet societal needs.
			CO1	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
	7A787	SUMMER INDUSTRY INTERNSHIP – II	CO2	Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
			CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
			CO4	Improve their communicative skills and team skills largely improve.
			CO5	Work as an individual and in a team
			CO6	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
IV- II & A- 18			CO1	Understand working of Electric Vehicles and recent trends
	7A835	ELECTRICAL AND HYBRID VEHICLES ( <b>PROFESSIONAL</b>	CO2	Analyze different power converter topology used for electric vehicle application
	14033	(PROFESSIONAL ELECTIVE-IV)	CO3	Develop the electric propulsion unit and its control for application of electric vehicles.
	7A820	ELECTRICAL DISTRIBUTION SYSTEMS (PROFESSIONAL	CO1	Know the importance of terms used in distribution system such as load factor, loss factor etc and how these are interred related.
			CO2	Know the importance of different voltages in primary & secondary distribution systems and types of feeders in our country.
		ELECTIVE – V)	CO3	Identify the importance of location of optimal sub –station through theoretical methods.
			CO4	Calculate power loss and voltage drop in balanced lines and derivations connected with

				these.
			CO5	Understand various types of protective devices and where and how these are used and the general procedure to coordinate protective devices.
			CO6	Understand the importance of power factor voltage control and how to improve it with various types of correction equipments and best location for them in a system so as to give optimum results.
			CO1	Develop plans with relevant people to achieve the project's goals
			CO2	Break work down into tasks and determine handover procedures
			CO3	Identify links and dependencies, and schedule to achieve deliverables
	7A883	PROJECT - II	CO4	Estimate the human and physical resources required, and make plans to obtain the necessary resources
			CO5	Allocate roles with clear lines of responsibility and accountability with team spirit.
			CO6	Design and develop the software or prototype to meet societal needs



## Course Outcomes of Mechanical Department





## Department of Mechanical Engineering COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and regulation	Course code	Course name		Co's
			CO1	Explain semiconductor behavior, types and their applications
			CO2	Differentiate the wave and particle, and its application for a particle in one dimension box
			CO3	Explain about emission, its types, laser principle and applications of optical fibers (sensors and medical endoscopy)
	9HC07	Engineering Physics	CO4	Reveals about the magnetism-its origin and types and its applications
			CO5	Explain the basic concepts of dielectric materials, polarization and its types, their applications (piezo, ferro and Pyro electricity).
			CO6	Summarize nano& bulk concepts, surface to volume ratio and its applications.
	9FC01	Problem Solving using C	CO1	Explain basic fundamentals of Computer Systems, computing environments, Computer Languages – Machine Languages
			CO2	Describe C language Programs, Structure of a C Program
I-I & A22			CO3	Describe write programs using control structures such as Pre-test and post-test loops, while, do while, for, break
			CO4	Write programs implementing application on arrays
			CO5	Write programs using Pointers and string handling functions
			CO6	Write programs using Enumerated, Structure, Union types and files.
			CO1	Check the consistency or inconsistency of a linear system and can solve the problems.
			CO2	Find the Eigen values and Eigen vectors and can solve the problems associated with these concepts.
	9HC11	MATRIX ALGEBRA AND	CO3	Find the nature, index and signature of the quadratic form.
	унсп	CALCULUS	CO4	Verify the applicability of mean value theorems and also can express the givenstandardfunction in series form using Taylor's and Maclaurin series.
			CO5	Find the solutions of first order first degree differential equations and solve the problems on Newton's law of cooling, Natural growth and decay.

			CO6	Solve higher order ordinary differential equations with constant coefficients using some standard methods.
			CO1	Demonstrate competence with suitable accuracy in vocabulary, and language fluency.
			CO2	State the definition of nouns, verbs, adjectives, and adverbs.
	011/201	Essential English Language Skills	CO3	Identify the differences of each tense and use the tenses accurately.
	9HC01	(EELS)	CO4	Identify specialized reading strategies for specific types of texts
			CO5	Produce written work that is substantive, organized, and grammatically accurate.
			CO6	Demonstrate competence with suitable accuracy in vocabulary, and language fluency.
			CO1	Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
		Engineering Graphics	CO2	Understand and Implement Orthographic projections and draw projections of simple drawing entities such as points Lines, and Planes
	9BC01		CO3	Draw projections of different types of regular solids in various positions wrt principal planes of projection
	96001		CO4	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
			CO5	Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views
			CO6	Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software
			CO1	Describe people, objects and situations using simple sentences.
		Oral Communication	CO2	Use appropriate tenses and expressions in different contexts of conversations.
	9HC61	Lab-I	CO3	Identify major areas of concern in their oral communication and address them.
			CO4	Create a SMART plan to enhance their communication skills in English
			CO1	Demonstrate the wave length of monochromatic source of light by using Newton's Rings
	9HC65	Applied Physics Lab	CO2	Analyze refractive index of a material prism and Dispersive power of a glass Prism by using spectrometer
			CO3	Determine the wave length of spectral light and laser Source of light by using Diffraction Grating
			CO4	Design and Analyze RC Circuits

			CO5	Analyze RLC Series circuit and parallel circuit
			CO6	Investigate magnetic Circuits
			CO1	To formulate the algorithms for simple problems
			CO2	To translate given algorithms to a working and correct program
			CO3	To be able to correct syntax errors as reported by the compilers
		Problem Solving	CO4	To be able to identify and correct logical errors encountered at run time
	9FC61	using C Lab	CO5	To be able to write iterative as well as recursive programs
			CO6	To be able to represent data in arrays, strings and structures and manipulate them through a program
			CO7	To be able to declare pointers of different types and use them in defining self referential structures.
			CO8	To be able to create, read and write to and from simple text files.
	9HC04	ENGINEERING CHEMISTRY	C01	To understand microscopic chemistry in terms of atomic and molecular orbitals
			CO2	To learn the preparation and applications of commercial polymers and lubricant materials
			CO3	To learn the industrial problems caused by water and municipal water treatment
			CO4	To acquire knowledge about different types of batteries and their working mechanism
			CO5	To develop the concepts and types of corrosion and the factors influence corrosion
I-II & A22			CO6	To understand the control methods and protective coatings for metals and other surfaces
			CO1	Design the programs using structures, unions and enum.
			CO2	Demonstrate the concepts of Abstract data type and also applications of stacks and queues.
	9EC01	DATA	CO3	Implement basic operations on single, double and circular linked list.
		STRUCTURES	CO4	Solve problems involving Binary Search trees and AVL trees.
			CO5	Articulate the concepts of graphs, heaps and hashing.
			CO6	Develop algorithms for various searching and sorting techniques and analyze their performance.

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	9HC12		CO1	Find the limits and test for the continuity and differentiability of a function.
			CO2	Solve the problems on multiple integrals.
		ADVANCED	CO3	Solve linear and nonlinear first order partial differential equations.
		CALCULUS	CO4	Find Series expansion a function defined over the intervals.
			CO5	Find directional derivative, gradient, divergence and curl of a function.
			CO6	Solve problems of line, surface and volume integrals.
			CO1	1. to analyse the system of forces, free body diagrams to solve problems dealing with forces in a plane.
			CO2	2. to analyse plane frame and solving using different methods like method of joints and method of sections friction concept and applications like wedge friction.
	9BC02	Engineering Mechanics	CO3	3. to understand the properties of surfaces and volumes and roll played by centroid and centre of gravity in different applications.
			CO4	4. to understand second moment of area and mass moment of inertia and its application strength of materials in evaluating strength.
			CO5	5. to understand analysis of rigid body rotation and kinematics and kinetics of particle & rigid body.
			CO6	6. To analyse Application of work energy method and impulse momentum method to rigid bodies
		Oral Communication	CO1	Understand the nuances of striking a great conversation in formal and informal situations.
	9НС62	Lab-II	CO2	Gain experience of facing an audience and speaking in public.
			CO3	Design a winning presentation and present it with ease.
			CO1	Preparation of Inorganic compounds
			CO2	Determination surface tension of a liquid
			CO3	Determination viscosity of lubricant
	9HC64	Engineering Chemistry Lab	CO4	Determination acid value of an oil
			CO5	Estimation hardness of water
			CO6	Analysis the amount of chloride content
			CO7	Determination of cell constant and conductance of solutions

			CO8	Determination of redox potential and emf of solutions
			CO9	Determination of the rate constant of acid
			CO1	Write programs on structures and unions.
			CO2	Implement Stacks, Queues and circular queues using arrays.
	9EC61	Data Structures Using C Lab	CO3	Write programs to implement basic operations on various types of linked list.
			CO4	Implement insertion and traversal operations on binary search tree
			CO5	Develop programs on various searching, sorting algorithms.
			CO1	Use various types of conventional manufacturing Processes
		Workshop/Manufact	CO2	Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience
	9BC61	uring Processes Lab	CO3	Manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.
			CO4	Produce small devices / products /appliances by assembling different components
		Complex Analysis, Probability And	CO1	Basic concepts of Complex Analysis and conformal mapping and their properties.
			CO2	Series expansion of a function using Taylor's and Laurent's series. Evaluation of definite integrals and improper integrals.
	8HC15		CO3	Concepts of probability and will able to solve problems on discrete and continuous probability distributions.
		Statistics	CO4	Learn basic concepts of sampling distribution and able solve problems on estimation.
			CO5	Concepts of Control Charts
II-I A-20			CO6	Testing the hypothesis concerning to large size and small size samples also goodness of fit and independence of attributes using chi-square distribution.
			CO1	Gains exposure towards Python versions and their specifications.
			CO2	Build programs using primitive data types.
	8FC21	Python programming and Algorithms	CO3	Write applications that include functions, modules, packages along with respective exceptional handling mechanism.
			CO4	Writes applications using OO features of Python
			CO5	Write applications using Files.
			CO6	Hands on exposure on NumPy/Tkinter/Plotpy modules.
	8HC05	Environmental Science and Ecology	CO1	Understand about ecosystem and energy flow among the organisms.

		CO2	Know the resources available, use of them and
		CO2 CO3	overexploitation of the resources in the nature.Learn the value, use and value of biodiversity.
		CO3	Understand the causes and effect of pollution and
		04	implement measures in control of pollution.
		CO5	Understand the sustainable development and implement green technology for sustainable development
		CO6	Learn and implement policy to protect the environment.
		CO1	Outlines the significance of management, defines the basic concepts and applicability of management principles in changing paradigms.
		CO2	Helps in understanding organization behavior, personality determinants and other key aspects
8ZC01	Economics, Accountancy and Management Science	CO3	Infers the need to understand the importance of Strategic management and Business environment in particular
	6	CO4	Enrich students with basic concepts of Financial Accounting.
		CO5	Understand basic concepts of Depreciation and need for preparing trial balance.
		CO6	Helps in preparation of Financial Statements (final accounts).
	Thermodynamics	CO1	The students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions
		CO2	Students can evaluate changes in thermodynamic properties of substances
8B306		CO3	The students will be able to evaluate the performance of energy conversion devices
		CO4 The students	The students will be able to differentiate between high grade and low grade energies.
		CO5	The students will be able to use property table and Mollier charts to evaluate properties of steam at different states.
		CO6	The students will be able to analyze and evaluate the performance of basic thermodynamics cycles
	8B307 Materials Science and	CO1	identify crystal structures for various materials including metals and alloys and understand the impact of defects in such structures at atomic scale.
8B307		CO2	understand fracture modes in failure of the industrial components during their service and failure under fatigue conditions.
Metallurgy	CO3	acquire the knowledge of finding number and amounts of phases, by using Lever Rule, draw and analyze the phase diagram for different binary alloys; concept of nucleation, growth of crystals and application of some cast and wrought non-ferrous metals/alloys used in industry.	

		CO4	acquire the knowledge of industrially important Fe-Fe <sub>3</sub> C phase diagram, various cast irons, steels and their applications in industry
		CO5	acquire the knowledge of different industrial heat treatment processes for steels; Surface hardening processes, how mechanical properties could be altered by implementing various heat treatment processes.
		CO1	Understand the principles and requirements of the machine drawings.
		CO2	Understand the various symbols used in machine drawing.
	Machine Drawing and	CO3	Understand the principles and requirements of various Assembly drawings.
8B308	Computer aided	CO4	Drawing of different machine components
	Drawing Practice	CO5	Imagine and drawing the assembly by seeing the components given.
		CO6	Ability to understand the existing geometric modeling and develop a geometric modeling for a new component in design process
	Metallurgy Lab & Mechanics of Solids Lab	CO1	acquire the knowledge of preparation of samples for metallurgical study.
8B363		CO2	acquire the knowledge of preparation of sample for metallurgical study of a plain carbon steel, cast iron, alloy steel, heat treated steel and their interpretation.
		CO3	acquire the knowledge of preparation of sample for metallurgical study of nonferrous metal/alloy and interpretation
		CO1	To determine the flash and fire point using Abels Apparatus
		CO2	To determine the flash and fire point using Pensky Martens Apparatus
8B364	Fuels and Lubricants	CO3	To determine the Viscosity using Saybolt Viscometer
80304	Lab	CO4	To determine the Calorific value using Bomb Calorimeter
		CO5	To determine viscosity using red wood viscometer
		CO6	To detremine Calorific value using Junkers Calorimeter
		CO1	Comprehend the concepts in the core and elective courses.
8B393	Comprehensive test and Viva-voce-III	CO2	Exhibit technical knowlegde to face interviews.
		CO3	Exhibit life long Learning skills for higher education and to persue Professional practice.
		CO1	Deliver lecture on emerging technologies.
		CO2	Explain domain knowledge to resolve real time technical issues
8B387	Technical Seminar III	CO3	Demonstrate ability to lead and explain concepts and innovative ideas.
		CO4	Demonstrate team leading qualities.
		CO5	Demonstrate public speaking skills.

			CO6	Exchange new information that would not have been available otherwise.
			CO1	Understand the fundamentals of electrical engineering and DC machines.
			CO2	Understand the principles of AC circuits.
	8AC48	Elements of Electrical & Electronics	CO3	Understand the principle and operation of three phase induction motor and measuring instruments.
		Engineering	CO4	Understand the principle and operation of diode.
			CO5	Understand the principle and operation of transistor.
			CO6	Understand the principles of digital electronics
			CO1	Understand the concept of OOP with the need of constructing objects, and classes. Write programs using classes, objects, members of a class and the relationships among them needed for a specific problem.
			CO2	Identify the purpose and usage of principles of inheritance and polymorphism. Implement concepts of polymorphism, encapsulation and methodoverloading
	8EC41	Java Programming	CO3	Create Java application programs using sound OOP practices (e.g., interfaces and APIs) and proper program structuring (e.g., by using access control identifiers, automatic documentation through comments)
			CO4	Students understand and implement error exception handling andmulti-threading.
II-II-A-20			CO5	Students learn to create GUI for the specificapplications.
			CO6	Write programs for event-handling using various user interface components on applets.
	8HC17	Universal Human Values	CO1	This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as "H-102 Universal Human Values.
			CO2	Understanding Harmony is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.
			CO1	Select moulding material, pattern and calculate pattern allowances used in casting and design the gating system and Design a suitable riser for the casting and decide specific casting type for a defect free product
	8B409	Manufacturing	CO2	Distinguish between different forming processes and Analyze the forces and power consumed in rolling operation
		Processes	CO3	Decide the specific forging/ extrusion process for making a part and identify the specific defects if any in the process
		CO4	Suggest the sheet metal process for making a part and decide the processing technology for a particular type of plastic.	

		CO2	<ul><li>understand velocity and acceleration diagram in order to evaluate the inertia forces in mechanism and machines.</li><li>understand concept of steering gear mechanism, types</li></ul>
8B410	Kinematics of	CO3	and Hooke's joint with respect to an automobile.
	Machinery	CO4	In order to understand and design complex motions possible out of comes and followers.
		CO5	understand the concept pf toothed gears and selection different types of gear trains in order obtain required velocity ratios.
		CO6	understand transmission power by various means like belts, rope and chains and their advantages and limitations.
		CO1	understand the fluid properties and measurement of pressure with monometers.
		CO2	Understand the classification of fluid, Bernoulli's equation, momentum equation and their applications
		CO3	understand Reynolds's experiment, major losses, minor losses
8B411	Fluid Mechanics and Hydraulic Machinery	CO4	understand velocity triangle, work done calculations, elements of Hydroelectric power plant, pump storage plant.
		CO5	Understand the classifications of turbines working principles of turbines, draft tube theory, performance of turbine.
		CO6	Understand various types of pumps working principle of reciprocating pump, centrifugal pump, performance characteristics of centrifugal pump.
		CO1	enhance oral communication skills
		CO2	develop the skill of speaking extemporaneously
8HC03	Soft Skills	CO3	enrich their vocabulary and subsequently hone their verbal aptitude
011205	Soft Skins	CO4	learn to make formal presentations both online and offline.
		CO5	learn to listen and comprehend well
		CO6	learn the nuances of the art of group discussion
		CO1	enhance oral communication skills
8HC63	Soft Skills Lab	CO2	develop the skill of speaking extemporaneously
0000	Son Skills Lab	CO3	enrich their vocabulary and subsequently hone their verbal aptitude

			CO4	learn to make formal presentations both online and offline.
			CO5	learn to listen and comprehend well
			CO6	learn the nuances of the art of group discussion
			CO1	Understand the fundamentals of electrical engineering and DC machines.
			CO2	Understand the principles of AC circuits.
	8AC95	Electrical & Electronics	CO3	Understand the principle and operation of three phase induction motor and measuring instruments.
		Engineering lab	CO4	Understand the principle and operation of diode.
			CO5	Understand the principle and operation of transistor.
			CO6	Understand the principles of digital electronics
			CO1	Make a pattern preparation of sand mould and cast the part
		Manufacturing Processes Lab	CO2	Perform welding operation under different conditions and test the quality of the weld
	8B465		CO3	Make use of plasma technique for accurately cutting metals and also perform brazing operation
			CO4	Identify the various press working operations and various parts of hydraulic press and perform operations
			CO5	Choose the appropriate plastic molding method to manufacture a plastic product
			CO1	compute the performance of pelton wheel under working conditions
			CO2	compute the performance of francis turbine under working conditions
	<b>9D</b> 466	Fluid Mechanics and	CO3	compute performance of reciprocating pump under working conditions
	8B466	Hydraulic Machinery Lab	CO4	compute the Performance of centrifugal pump under working conditions
			CO5	compute the Performance of multistage pump under working conditions
			CO6	compute the coefficient of discharge of venturimeter of orifice meter under working conditions
			1	Comprehend the concepts in the core and elective courses.
	8B494	Comprehensive test and Viva-voce-IV	2	Exhibit technical knowledge to face interviews.
			3	Exhibit lifelong Learning skills for higher education and to persue Professional practice

			CO1	The students will be able to understand cyber-attacks, types of cybercrimes.
			CO2	Realize the importance of cyber security and various forms of cyber attacks and countermeasures.
			CO3	Get familiar of cyber forensics.
	8FC24	Cyber Security (Grade Award)	CO4	Get familiar with obscenity and pornography in cyber space and understand the violation of Right of privacy on Internet.
			CO5	Cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
			CO6	Elucidate the various chapters of the IT Act 2008, power of Central and State Government to make rules under IT Act 2008.
			CO1	Compare the air standard, actual and the fuel-air cycles of Internal Combustion Engines.
			CO2	Classify IC Engines, understand the working principles of 2-stroke and 4-stroke cycles, draw valve and port timing diagrams and explain different engine subsystems.
	8B512	Applied Thermodynamics-I	CO3	Understand the combustion process in S.I and C.I Engines, the phenomenon of knocking, factors affecting knocking, and different types of combustion chambers for S.I and C.I Engines,
III-I-A-20			CO4	Understand the performance parameters, methods of measurement of brake and friction power and Draw the heat balance diagram.
			CO5	Understand the working principles of Roots blower, vaned blower, reciprocating compressor-single stage and multi-stage compression with inter cooling.
			CO6	Understand the working principles of centrifugal and axial compressors and draw the velocity diagram and calculate the Compressor Power input and efficiency.
			CO1	Understand the phenomenon of friction and in developing different applications like, brakes, clutches and dynamometers etc. [CO1]
			CO2	Understand the effect of precession motion on the stability of moving vehicles. [CO2]
	8B513	Dynamics of Machinery	CO3	Understand and development of speed controlling devices like flywheel. [CO3]
		indefinitery	CO4	Understand how to control speed in engines or turbines by governors. [CO4]
			CO5	Understand how to balance different systems, machines and engines. [CO5]
		CO6	Understand how to do analysis of different vibrating systems. [CO6]	

			CO1	Understand the basic metal cutting process and parameters, Forces in metal cutting, various chips, tool materials, basic relations in metal cutting [CO1]
			CO2	Understand the thermal aspects of metal cutting, tool wear, tool life, various cutting tool materials and economic analysis of machining [CO2]
	8B514	Metal Cutting and Machine Tools	CO3	Understand the principle and working of lathe, shaping, planning, slotting machines and Drilling machines and estimate the machining time [CO3]
			CO4	Understand the principle and working of Milling machine and Broaching machine [CO4]
			CO5	Understand the principle and working of Grinding machine, Lapping and Honing machine [CO5]
			CO6	Understand the principle of Jigs & Fixtures and the principles of advanced machining processes[CO6]
			CO1	• Use different theories of failure for designing machine members subjected to steady loads and fatigue loads.[CO1]
		8B515 Design of Machine Members -I	CO2	<ul> <li>Use different criteria of failure for designing machine members subjected to fatigue loads.[CO2]</li> </ul>
			CO3	• Develop ability to analyze, design and select shafts, keys, couplings, cotter and knuckle joints.[CO3]
	8B515		CO4	• Able to analyze and design the helical coiled and leaf springs.[CO4]
			CO5	• Identify the applications where Temporary (threaded and bolted) joint and permanent (riveted) joints are used for various applications - with attention to design requirements.[CO5]
			CO6	• able to design and analyze various Welded joints [CO6]
			CO1	Co1: Understand the types of Fluid Power Systems
		Fluid Power	CO2	Co2: Understandthegain knowledge of Hydraulic System
	8B516	System(FPS) (Professional Elective-	CO3	Co3: Demonstrate varies control valves of Fluid Power Systems
		(Professional Elective- I)	CO4	Co4:Demonstrate Fluid Power Circuits
			CO5	Co5: Understand the pneumatic Systems
			CO6	Co6: Understandthe typical Hydro-pneumatic Circuits for Industrial Applications
	8B517	Power Plant	CO1	Co1: Acquire the basics of sources of Energy and combustion processes
	02017	Engineering(PPE)	CO2	Co2: Evaluate the details of Internal combustion engine Plants

			CO2	Co2: Demonstrate hudro Electric Derror Diant
			CO3	Co3: Demonstrate hydro Electric Power Plant
			CO4	Co4: Realize the significance of Non Conventional Energy plants
			CO5	Co5: Understand the working o nuclear power plant
			CO6	Co6: Explain the economics and environmental issues of various power plants
			CO1	CO1: Learns various OR methods and modeling of Job allocation with Linear program
		Operation	CO2	CO2: Analyze the transportation and Assignment models
	<b>9D5</b> 19	Research((OR)	CO3	CO3: Lear sequencing and Replacement models
	8B518	(Professional Elective- I)	CO4	CO4: Understand theory of gaming and inventory model
			CO5	CO5: Demonstrate various waiting models and their limitations
			CO6	CO6: Understand the basics of dynamic programming
			CO1	CO-1: Understand the vehicle lay-out and body types
			CO2	CO-2: Comprehend the working of Clutch and gearing system
		Automotive Chassis	CO3	CO-3: Acquire the knowledge of Automatic transmission
	8B519	(Professional Elective- I)	CO4	CO-4: Comprehend the working of driveline system
			CO5	CO-5: learn principles and types of steering and suspension system
			CO6	CO-6: Demonstrate the construction and working of brake, wheel and tyre assembly
			CO1	1. The students' will acquire basic knowledge on Skills of Entrepreneurship.
		Basics of Entrepreneurship	CO2	2. The students' will understand the techniques of selecting the customers through the process of customer segmentation and Targeting
	8ZC22		CO3	3. Business Models and their validity are understood by the students'.
		(Open Elective-I)	CO4	4. The basic cost structure, Revenue Streams and the pricing strategies are understood by the students'.
			CO5	5. The students' will acquire knowledge about the project management and its techniques.
			CO6	6. The students' get exposure on marketing strategies and business regulations for the Start up.
			CO1	1. Gain knowledge relating to Economics, various sectors and its growth
	8ZC25	Basics of Indian	CO2	2. Will gain knowledge relating to various concepts of National income and related aggregates
		Economy (Open Elective-I )	CO3	3. Students will learn about Indian Industrial policy and benefits of LPG to India
			CO4	4. Comprehend knowledge relating to Fiscal policy & Taxation system in India

			CO5	5. Learn about inflation & business cycles.
			CO6	<ul><li>6. Know about the BoP and its influence on</li></ul>
			000	economy.
			CO1	1. The students gain the knowledge on the inputs required for design thinking and also gain familiarity on concepts related to design thinking.
			CO2	2. The students learn the techniques of idea generation
	8ZC08	Design literacy and Design Thinking(Open	CO3	3. The students gain knowledge on different phases of design thinking
		Elective-I)	CO4	4. The students realize the product design process.
			CO5	5. The students gain familiarity on design thinking for service design.
			CO6	6. The students gain knowledge on various cases related to design thinking.
			CO1	1. Describe the new dimensions and products served by the banking system in INDIA.
		Banking Operations,	CO2	2. Explain the credit control system and create awareness on NPA's
	8ZC05	Insurance and Risk	CO3	3. Apply the knowledge of Insurance concepts in real life scenarios
			CO4	4. Recognize the importance of regulatory and legal frame work of IRDA
			CO5	5. Identify the risk management process and methods.
			CO6	6. Calculate the diversity of risk and return
			CO1	1. To understand number systems and apply the rules of Boolean algebra to simplify Boolean expressions using theorems and K-maps.
		Fundamental of Digital	CO2	2. To design combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters etc.
	8DC42	Circuits and Microprocessors(Open	CO3	3. To design basic memory units (latches and flip- flops) and sequential circuits
		Elective-I)	CO4	4. To understand Architecture of 8086 and analyzing in single mode and in multi processor mode.
			CO5	5. To understand instructions of 8086 and to write Assembly Language Programs
			CO6	6. To interface I/0 devices with 8086.
	8EC74		CO1	1. Students will learn basics of databases and understand the architecture of database management systems.
		Database systems Concepts(Open Elective-I)	CO2	2. Students will learn about good database design techniques and database theories behind.
			CO3	3. Understand conceptual database designs, and functional dependencies and normalization.
			CO4	4. Students will understand the Mathematical foundation for relational databases.

				5. Student will be able to understand
			CO5	concept of Constraints, Views and will be able to create dynamic databases.
			CO6	6. Learn transaction management, concurrency controls.
			CO1	1. Learn basic concepts of control systems.
			CO2	2. Study about time response analysis.
	0.4.6.4.6	Control System	CO3	3. Learn basic concepts of stability and root locus method.
	8AC46	Engineering(Open Elective-I)	CO4	4. Study about frequency response analysis.
			CO5	5. Learn basic concepts stability analysis in frequency domain.
			CO6	6. Learn fundamentals of state space analysis.
			CO1	1. Performance test on air compressor will make the student to analyze the performance of the compressor(CO1)
		8B568 Applied Thermodynamics Lab	CO2	2. Disassembly and assembly of I.C engine and Valve timing diagram will make the student understand the internal components and their functionality and study of boilers(CO2)
	8B568		CO3	3. Heat balance test and performance of four stroke single cylinder diesel engine and will make the student understand have the energy supplied to the engine (CO3)
			CO4	4. Vapour compression Refrigeration system and Air conditioning system will make the student understand the components and working of a refrigeration cycle(CO4)
			CO5	5. computerized IC engine and variable compression ratio engine performance will make the student understand have the energy supplied to the engine in distributed in a cycle.(CO5)
			CO6	6. Performance of four stroke petrol engine and Morse test will make the student understand have the energy supplied to the engine.(CO6)
			CO1	:Make simple products using lathe and covering various machining operations as per drawing
			CO2	Produce jobs as per drawing using shaper, PlanerandSlotter machines
	8B569 Machine Tools Lab	Machine Tools Lab	CO3	Understand the principle and working of Drilling machine and conduct various machining operations as per drawing
			CO4	Work on Tool & Cutter Grinding, Milling machine and conduct various machining operations as per drawing
			CO5	:Perform surface grinding operation and conduct alignment test on lathe and drilling machines
	8B570	KOM & DOM Lab	CO1	1) Understand the concept of vibrations, able to calculate the acceleration due to gravity and stiffness

			CO2	Understand concept of radius of gyration
			CO3	Draw the displacement diagram of cam and follower and study the characteristics of governor
			CO4	Understand the tensional vibrations
			CO5	Understand the gyroscopic effects and balancing of rotating masses
			CO6	Understand the pressure distribution in a journal bearing and critical speeds of shafts.
			CO1	Understand the concepts of state space representation and calculate time and space complexities of exhaustive search and heuristic search together.
			CO2	Apply AI techniques to solve problems of advanced searching techniques.
	05075	Artificial Intelligence(Grade	CO3	Distinguish different knowledge representation techniques.
	8EC75	Award)	CO4	Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.
			CO5	Analyze different learning techniques and decision trees.
			CO6	Use techniques to represent domain knowledge of the expert systems.
Ш-Ш-А-20			CO1	Understand steam power plants and the Rankine cycle on p-v, T-S and h-s diagrams
			CO2	Understand the working principles and basic design parameters of different types boilers.
			CO3	Understand the function of steam nozzle, Wilson line
	8B62 Applied Thermodynamics-II	CO4	Understand the difference between impulse and reaction turbines, draw velocity diagrams and understand the Principle of operation of reaction turbine, features of Parsons reaction turbine and to draw the velocity diagrams for the same	
		CO5	Understand the working principles of different condensers and understand the gas turbine power plants	
			CO6	Understand the working principle of jet propulsion and rocket engines
	8B621	CAD/CAM	CO1	To apply geometric transformation techniques in CAD.

1			1
		CO2	2.Develop mathematical models to represent curves and surfaces and model engineering components using solid modelling techniques.
		CO3	3.Develop programs for CNC to manufacture industrial components.
		CO4	4. Learn group technologies concepts
		CO5	5. Demonstrate the FMS and computer quality control
		CO6	6. Address CIM and computer Aided manufacturing Resources Plans
		CO1	Design bearings and select appropriate bearings using bearing catalogs.[CO1]
		CO2	design parts of internal combustion engine[CO2]
8B622	Design of Machine	CO3	derive design expression for spur and bevel gears [CO3]
	Members -II	CO4	design helical and worm gears [CO4]
		CO5	gain skills to design various pressure vessels.[CO5]
		CO6	Learn the application of statistical mathematics for machine design subject.[CO6]
		CO1	1. To demonstrate basic knowledge of heat transfer by understanding: differences between conduction, convection and radiation; Students shall be able to formulate basic differential equations for heat transfer; Students must able to understand the importance of thermal conductivity of materials.
	8B623 Heat Transfer	CO2	2. To deal with problems like conduction through walls and composite walls; critical radius of insulation; heat transfer in fins; Transient heat transfer.
		CO3	3. To Calculate of heat transfer coefficient; overall heat transfer coefficient; log-mean temperature differences.
8B623		CO4	4. To differentiate forced and natural convection problems correlations; and demonstrate the use of Biot, Nusselt, Reynolds, Grashof, Rayleigh and Prandtl numbers; basic radiative heat transfer, basic principles of mass transfer.
		CO5	5. To make the students capable of employing the heat transfer principles during phase change processes in heat exchangers; To bring in confidence to apply the principles in industrial appliances and machinery like Power Plants, Heat Exchangers, coolers etc
		CO6	6. To understand basic principles of radiation heat transfer and radiation heat exchange between surfaces.
	Mechanical	CO1	1.Understand the causes and effects of vibration in mechanical systems & single degree freedom vibrations.
8B624	Vibrations(MV)	CO2	2. learn methods to implement on SDF Vibrations
(Professional Elective- II )	CO3	3.Develop schematic models for physical systems and formulate governing equations of motion for two degree freedom system	

			CO4	4.Understand the role of multi degree in mechanical systems
			CO5	5. Analyze and design continuous vibration system
			CO6	6.Analyze rotating and reciprocating systems and compute critical speeds.
			CO1	CO1: Understand the Principle and applications of Air Refrigeration system
			CO2	CO2: Demonstrate working of vapour compression Refrigeration System
	8B625	RAC(Refrigeration & Air Conditioning )	CO3	CO3: Understand the various components of Refrigeration system
		(Professional Elective- II )	CO4	CO4: Illustrate the vapour Absorption system
		,	CO5	CO5: Learn Principle and methods of basic Air conditioning system
			CO6	CO6: Gain knowledge Air conditioning Equipment's
			CO1	Student will identify the problem faced in traditional metal cutting and come to an understanding of theneed for the development of Unconventional machining processes
	8B626	Unconventional Machining(UM) (Professional Elective- II )	CO2	. Gain the knowledge of basic mechanism of various Unconventional machine processes namely UM and AJM related equipment, variables, advantages, limitations, applications.Given a set of physical, electrical and other parameters. Student can identify a suitable Unconventionalmachining process.
			CO3	Understand the learn various Thermal material Removing processes
			CO4	4. Understand the Acquire Knowledge in chemical Remaining processes
			CO5	5. Understand the demonstrate working of chemical material remaining process
			CO6	6. Understand the significance of micro machine
			CO1	CO-1: Understand the constructional details and combustion in automotive engines
			CO2	CO-2: Describe the principle and functions of an automotive fuel engine systems
	8B627	Automotive Engines (Professional Elective-	CO3	CO-3: Understand the role of senses and Activations inAutomotives
		II )	CO4	CO-4: Analyze engine measurements and performance characteristics for Engines with cooling and vibration
			CO5	CO-5: Discuss the concepts and working of charging
			CO6	CO-6: learns types and working of unconventional Engines

			CO1	The Students' gain knowledge on the stages of Startup and the turbulence environment it undergoes and the stages related to growth of the Startup.
			CO2	The Students are exposed to the various business models and critically evaluating the effectiveness of the business models and products
	8ZC23	Advanced Entrepreneurship	CO3	The students understand the method of business traction, create roles and build their A- team
	01010	(Open Elective-II)	CO4	The students understand the various channels of revenue building and exploration of new revenue avenues.
			CO5	The students understand the need of sales planning and people plan and also financial modeling
			CO6	The students are exposed to the legal implications affecting the company's prospects and identifying right mentors and advisors to support start ups
			CO1	1. Gain knowledge relating to the Indian Constitution and the Preamble to the Constitution.
	8ZC26	Basics of Polity (Open Elective-II)	CO2	2. Gain knowledge relating to the fundamental rights and duties of the Indian citizens and the directive principles of state policy.
			CO3	3. Students will learn about the federal structure and judiciary of India.
		$\mathcal{U}$ $\langle 1$	CO1	1. The students gain the knowledge on the inputs required for human centric design thinking the students learn the techniques of idea generation.
			CO2	2. The students gain knowledge on exploring the different phases of Ideation process.
	8ZC09		CO3	3. The students grasp the awareness on emerging technologies and understand 3d printing in manufacturing.
		Elective-II)	CO4	4. The students gain familiarity on development of prototypes.
			CO5	5. The students understand reverse engineering methods in product development.
			CO6	6. The students have access to information on IPR, and patent application.
			CO1	1. Students will understand the nature of Entrepreneurship andits importance
		Entrepreneurship	CO2	2. Will gain knowledge regarding project, its life cycle and organization
	8ZC19	Project Management and Structured Finance	CO3	3. Will gain knowledge relating to project formulation and implementation
		(Open Elective-II)	CO4	4. Comprehend the components of structured finance
			CO5	5. Establish a framework of CMBS
			CO6	6. Students will gain knowledge relating to the CRE Servicing

			C01	i. Design and verify basic logic gates
	8DC43	Introduction to VLSI Design (Open Elective- II)	CO2	ii. Draw layouts for a digital circuit for a specified technology and verify design rules and validate them.
		,	CO3	iii. Design schematics for the digital sub systems.
			CO1	1. Describe the basic functionalities and structure of the OperatingSystem
			CO2	2. Explain the concepts and implementations of: Processes, Process Scheduling. Describe, contrast and compare various types of Operating systems like Windows and Linux.
	8EC76	Operating Systems Concepts (Open	CO3	3. Comprehend the concepts of Synchronization and Deadlocks in the Operating System
		Elective-II)	CO4	4. Discuss the concepts of Memory Management (Physical and Virtualmemory)
			CO5	5. Explain the concepts of File System with regard to directory and disk management algorithms.
			CO6	6. Students understand the concepts of I/O systems, protection and security in a case study
			C01	1. To impart knowledge on Construction, principle of operation and performance of synchronous reluctance motors.
	8AC36	Special Machine s (Open Elective-II)	CO2	2. To impart knowledge on the Construction, principle of operation, control and performance of stepping motors.
			CO3	3. To impart knowledge on the Construction, principle of operation, control and performance of switched reluctance motors.
			CO4	4. To impart knowledge on the Construction, principle of operation, control and performance of permanent magnet brushless D.C. motors.
			CO5	5. To impart knowledge on the Construction, principle of operation and performance of permanent magnet synchronous motors.
			CO1	Draw computer Aided 2D drawings to solve design and manufacturing problems using CAD CAM principles.
			CO2	2. Acquire skills of developing geometric modelingof 3D components
	8B671	CAD/CAM Lab	CO3	3. Developing assemblies different machine elements and import and export CAD models one software to anther software
			CO4	4. Learn skills of writing CNC part programming.
			CO5	5. Understand how to machine simple components on CNC lathe and CNC mill
			CO6	Understand how to simulate the articulated robot and Fabricate simple components on 3D printing machine

			CO1	1. Compute the thermal conductivity of a given material rod and composite wall understand the physical significance of the thermal conductivity of the given material.(CO1)
			CO2	2. To calculate thermal conductivity of lagged pipe and insulating powder under given conditions.(CO2)
			CO3	3. To Understand the forced ad free convection heat transfer coefficients under given conditions from fundamentals.(CO3)
	8B672	Heat Transfer Lab	CO4	4. Understand the LMTD for parallel flow and counter flow heat exchangers and overall heat transfer coefficient.and pinfin apparatus. (CO4)
			CO5	Understand theemissivity of a given surface and to calculate Stefan-Boltzmann's constant experimentally.(CO5)
			CO6	Understand the phenomena of pool boiling and to draw the boiling curve by showing different phases of boiling.and study the heat pipe (CO6)
			CO1	• Students use the concepts learned in the courses, so far, in conceptualizing, designing and executing the projects.
		Group Project	CO2	• Enables to apply modern tools and technologies for project works
	8B673		CO3	• Inculcates an enthusiasm to use the creative ideas to execute projects to meet the current needs of the society.
			CO4	• Enhances communicative skills and team work
			CO5	• The students learn the ability to work as an individual with multidisciplinary approach
			CO6	
			CO1	1. Perform well in Technical interviews
	8B695	Comprehensive Viva- voce-II	CO2	2. Apply knowledge in building their career in particular fields.
		Voteni	CO3	3. Enhance their communication skills and interactive- ness.
			CO1	Student demonstrate the basic knowledge in robotic systems their classification and application areas
			CO2	Student demonstrate the Robotic Kinematic Models and its importance
IV-I-A-18	7B722	ROBOTICS	CO3	Student demonstrate the Robotic dynamically models
	/6/22	KUBUTICS	CO4	Student demonstrate the ability to plan trajectories in the presence/absence of obstacles
			CO5	Student learn the control system concepts and their application in robotics through linear and nonlinear control schemes

			CO6	Student understand commonly used sensory and vision systems used in robotics
			CO1	Understand the Additive manufacturing processes and their relationship with subtractive manufacturing
			CO2	Demonstrate comprehensive knowledge of the broad range of liquid based rapid proto type processes, devices, capabilities and materials that are available
		ADDITIVE	CO3	Demonstrate comprehensive knowledge of the broad range of liquid based rapid proto type processes, devices, capabilities and materials that are available
	7B723	MANUFACTURING PROCESSES	CO4	apply the principles of casting in Additive manufacturing systems
			CO5	Articulate the various tradeoffs of Additive manufacturing softwares / data format that must be made in selecting advanced/additive manufacturing processes, devices and materials to suit particular product requirements
			CO6	Learn various applications of additive manufacturing, such as in architecture, art, health care direct part production and mass customization
		/B724 MECHATRONICS(Profe ssional Elective-I)	CO1	able to understands the significance of integration of mechanical, electronics, control and computer engineering and also focuses the role of sensors
			CO2	able to learn the complete theory of various sensors
	7B724		CO3	be able to get skill to select appropriate actuators for different applications
			CO4	become proficient in building linear models of mechatronics
			CO5	become proficient in the programming of microcontrollers
			CO6	able to demonstrate PLCprogramming
			CO1	Demonstrate history, role, principle and steps of experimentation
		DESIGN AND ANALYSIS OF	CO2	Apply concepts of Probability and statistics in design of experiments
	, 5, 25	EXPERIMENTS(Profess	CO3	learn various DOE techniques
		ional Elective-I)	CO4	Develops experiment design based on Taguchi method
			CO5	Analyses the experimental data of various experiments
_			CO6	Solve multi response problems using DOE approaches
		OPERATIONS	CO1	Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.
7B726 (F	RESEARCH (Professional Elective- l)	CO2	Recognize and solve the problem of transportation involving a large number of shipping routes with least transportation cost and generate optimal assignment strategy for different situations	

			Use Johnson's rule to create the optimal sequencing	
		CO3	schedule for a sequencing problem and make decisions about replacing an item using replacement policy	
		CO4	Design and analyze different optimal strategies to win the game, justify the games using minimax or maximin principle to compute the value of the game using various rules.	
		CO5	Analyze the performance measures of Queuing system and calculate the EOQ for minimizing the total inventory cost	
		CO6	Apply simulation techniques for solving various types of problems and general idea development about Markov chains	
		CO1	Explain the compressible flow phenomena in turbomachine components	
		CO2	Understand the steady and unsteady flow phenomena in tucts	
78727	THERMAL TURBO MACHINERY(Professio nal Elective-I)	CO3	Perform simple aerodynamic designs using eulers equations etc	
		CO4	Explain the working steam turbines	
		CO5	Understand gas turbine combustor principles and challenges	
		CO6	Discuss jet propulsion technologies	
	CO1	Know the different approaches of synthesis of nanomaterials, gain in depth of knowledge which will be helpful to them in their career to go forward successfully in the field of nano science and nanotechnology		
		CO2	Learn about different physical and chemical methods for synthesis of nanomaterials	
7B728	NANOTECHNOLOGY(P rofessional Elective-I)	CO3	Characterization of nanomaterials by using SEM, TEM, AFM, STM	
		CO4	Characterization of nanomaterials by using XRD, FTIR, UV visible spectroscopy, Rama spectroscopy.	
		CO5	Applications of carbon based nanomaterials	
		CO6	Applications of nanomaterials in electronics, medicine, mechanical engineering.	
		CO1	to understand the history of AI and uninformed search Method	
	Artificial Intelligences (AI) for Mechanical Engineering (Professional Elective- II)	CO2	to demonstrate informed search graphs, rule and pruning & Evaluation methods	
7B729		(AI) for Mechanical	CO3	to demonstrate KR and KR&R through propositional logics and FOL
		CO4	To learn how to use BN, BNN, MDN in decision making	
		CO5	Learn various techniques for planning and sequential decision problem	
		CO6	brief out the basics of ML, SL,RL and CNN	

			CO1	<b>Understand</b> and <b>describe</b> the various available sources of energy, and the basic Steam power plant layout including the coal and ash handling equipments.
			CO2	<b>Discuss</b> and <b>classify</b> the types of coals, coal feeding stokers and other accessories.
	7B730	POWER PLANT ENGINEERING	CO3	<b>Define</b> and <b>elaborate</b> the understanding of the previously learn concepts to basics of Diesel Power Plant, Gas turbine plant and their auxiliaries.
		(Professional Elective- IV)	CO4	Gain the knowledge regarding Equipment, Plant layout, working principle of Hydroelectric Power plants, and able to draw hydrological cycle, Hydrographs etc.
			CO5	Familiarize with the Concepts of various nuclear reactors.
			CO6	<b>Apply</b> the established models of Economics in Power plant engineering.
		Production Planning and Control (Professional Elective- II)	CO1	Understand production systems and their characteristics to evaluate MRP and JIT systems against traditional inventory control systems
	7B731		CO2	Analyze aggregate planning strategies
			CO3	Apply forecasting and scheduling techniques to production systems. Understand theory of constraints for effective management of production systems
			CO4	Understand production systems and their characteristics to evaluate MRP and JIT systems against traditional inventory control systems
			CO5	Analyze aggregate planning strategies
			CO6	Apply forecasting and scheduling techniques to production systems. Understand theory of constraints for effective management of production systems
			CO1	Classify manufacturing processes
			CO2	Understand principles of casting and solidification
		ADVANCED	CO3	Understand manufacturing of porous powder metallurgical products
	78732	MATERIALS AND PROCESSING(Professio	CO4	Utilize forming and processing technologies to shape metals and ceramics
		nal Elective-II)	CO5	Understand the role of ceramics and composites in industrial applications
			CO6	Analyse the processing and defects of ceramics and polymers
			CO1	Classify Non-Destructive Testing (NDT) methods
		NON-DESTRUCTIVE TESTING OF	CO2	Understand principles of various NDT methods
	7B733	TESTING OF MATERIALS (Professional Elective- III)	CO3	Understand TECHNIQUES OF ULTROSONIC and thermography
			CO4	Gain knowledge in radiography
			CO5	Demonstrate the Acoustic methods

			CO6	Learn how to interpret the various techniques used in various case studies
			CO1	Attain the basic techniques of quality assessment , fundamental knowledge of statistics and probability and Use control charts
		QUALITY AND	CO2	learn principles of DOQ design for quality
	78734	RELIABILTY ENGINEERING	CO3	Use reliability concepts to analyze for improving the process quality
		(Professional Elective- III)	CO4	Describe various methods to asses reliability determination
			CO5	Acquire basic knowledge of reliability management
			CO6	Understand the concepts of risk management
			CO1	Understand of solar energy, working principle of various solar energy and hybrid wind energy systems.
		RENEWABLE ENERGY	CO2	Apply the concept of bio-energy, develop different types of biofuels, biochemical.
	7B735	AND ENERGY MANAGEMENT	CO3	Design and develop different types of Biogas Plants and its applications.
	10100	(Professional Elective-	CO4	Estimate wind energy and wind energy conversion system.
		)	CO5	Demonstrate different renewable energy sources like Geothermal, Tide and Wave Energy.
			CO6	Illustrate the knowledge on production and application of Hydrogen Energy and fuel cell.
		PRODUCT DESIGN (Professional Elective- III)	CO1	Apply structural approach to concept generation, selection and testing
			CO2	Understand various aspects of design such as industrial design, design for manufacture
	7B736		CO3	Economic analysis and product architecture
	/0/30		CO4	Apply structural approach to concept generation, selection and testing
			CO5	Understand various aspects of design such as industrial design, design for manufacture
			CO6	Economic analysis and product architecture
			CO1	Identify the national and international standards pertaining to machine drawing
		PRODUCTION	CO2	Apply limits and tolerances to assemblies and choose appropriate fits
	7B776	DRAWING PRACTICES	CO3	Recognize machining and surface finish symbols.
		LAB	CO4	llustrate various machine components through drawings.
			CO5	Examine assembly drawing by seeing the components given
	70777	INSTRUMENTATION	CO1	Experimentation on the pressure gauge and analyzing the performance of the pressure gauge
	78777	LAB	CO2	Examining the working of the transducer for temperature measurement.

			CO3	Evaluate the LVDT transducer for displacement measurement and Assess displacement
			CO4	Examining the temperature by the strain gauge method.
			CO5	Testing the capacitive transducer for angular measurement.
			CO6	Evaluating the performance of loadcell and comparing experimental& theoretical values
			CO1	<i>Apply</i> finite element method to <i>solve</i> static and dynamic analysis problems
			CO2	of 1D,2D trusses, beams with different boundary conditions
	7B778	CAE LAB	CO3	<b>Develop</b> finite element method to <b>solve</b> plane stress, axi-symmetric solids three dimensional problems with different boundary in solid mechanics.
			CO4	<i>Generate</i> finite element method to <i>solve</i> steady state heat transfer analysis of a composite wall and a Fin with different boundary conditions.
			CO1	Students use the concepts learned in the courses, so far, in conceptualizing, designing and executing the projects
		PROJECT-I	CO2	Enables to apply modern tools and technologies for project works
	7B779		CO3	Inculcates an enthusiasm to use the creative ideas to execute projects to meet the current needs of the society
			CO4	Enhances communicative skills and team work
			CO5	The students learn the ability to work as an individual with multidisciplinary approach
			CO1	Understand the concepts and applications of composite materials
		Mechanics	CO2	Analyze micro mechanical behaviour of a lamina
	7B837	Manufacturing Methods of	CO3	Learn matrix tranformation for stress and strain in composites
		Composite Materials (Professional Elective-	CO4	Analyze Elastic behavior of composites
		IV)	CO5	Develop governing equations for bending strength evaluation in laminated plates
			CO6	Gains knowledge of manufacture of composites
IV-II A-18		DESIGN AND	CO1	Understand the principles of materials selection and design
		ANALYSIS OF ENGINEERING	CO2	Design components using appropriate attribute limits and material indices
	7B838	MATERIALS (Professional Elective-	CO3	Establish the criteria for material qualification and acceptance.
		IV)	CO4	Apply design principles for manufacturing of different engineering components
	7B839	AUTOMOBILE	CO1	dentify front wheel drive, rear wheel drive and four wheel drive

	ENGINEERING		Outline the fuel systems like petrol injection system
	(Professional Elective-	CO2	and diesel injection system
	IV)	CO3	Classify the thermo, water, forced circulation system and Understand the ignition system
		CO4	Understand the various emission standards and Outline various Electrical starting systems
		CO5	Understand about clutches and Distinguish single plate clutch, multi plate clutch, wheels, tyres and differential gear box
		CO6	Know the steering geometry – Ackerman steering mechanism and Davis steering mechanism toe-in, and to know the objects of suspension system
		CO1	Understand abrasive and electrical discharge machining processes
	Advanced	CO2	list the advances in casting
7B840	Manufacturing Processes	CO3	learn principles and applications of electron beam, ion beam and laser hybrid welding processes
	(Professional Elective- IV)	CO4	apply advanced forming processes to manufacture mechanical products
		CO5	Understand the advantageous of micro fabrication
		CO6	realize the importance of nano fabrication
		CO1	Understand Evaluation and applications of FMS
	FLEXIBLE	CO2	Understand Machining centers and FMS layouts
	MANUFACTURING	CO3	Design and analyze FMS material handling systems
7B841	SYSTEMS & MACHINE VISION	CO4	Understand tool management and scheduling tools in FMS
	(Professional Elective- V)	CO5	Identify the role of computers in FMS and machine vision and evaluate the performance of FMS
		CO6	Analyze case studies a typical FMS
		CO1	Basics of optimization, considerations relevant to mechanical / structural systems
	DESIGN	CO2	Concepts and methods for single-variable unconstrained and constrained optimisation
7B842	OPTIMIZATION (Professional Elective-	CO3	Concepts and methods for multi-variable unconstrained and constrained optimization
	V)	CO4	Techniques for nonlinear optimization
		CO5	Advanced optimization techniques
		CO6	Optimisation of complex mechanical elements
		CO1	Derive the thermal efficiency of gas turbine cycle and working of gas turbine plant.
7B843	JET PROPULSION and ROCKET ENGINEERING (Professional Elective-	CO2	Determine the performance evaluation, thrust augmentation Of turbo jet engines.
	(Professional Elective- V)	CO3	DISCUSS the plant layout of Ramjet , principle of operation
		CO4	understand liquid propellant Rocket engines, compassion of propulsion systems.

			CO5	Describe the flight mechanics and applications of trust profiles, analyze the rocket heat transfer and ablative to
			CO6	coolingAPPLY the concepts in criogenics, advancedpropulsion systems, elementary treatment of ElectricalNuclear and Plasma Arc propulsion
			CO1	gain knowledge on using numerical techniques
			CO2	Understand various applied numerical methods to solve fluid flow problems
	70044	COMPUTATIONAL FLUID DYANAMICS	CO3	understand and apply finite volume method to solve heat transfer problems
	7B844	(Professional Elective- V)	CO4	know application of finite volume method and fundamentals of fluid flow modeling
			CO5	right fluid flow governing equations, momentum and energy equations apply to fluid flow problems
	7B845     CARBON BASED NANOSTRUCTURES AND THEIR APPLICATIONS (Professional Elective- V)	CO6	gain knowledge about different algorithms	
		CO1	To investigate and formulate method to use carbon nanotubes as active components in organic electronic devices	
		CO2	To explore methods of synthesis to obtain SWNT with desired characteristics	
		CO3	To understand the dependence of the performance of the nanotubes based transistors on the nanotube bundle geometry	
		(Professional Elective-	CO4	Apply the knowledge acquired for synthesis of CNTs by various methods.
			CO5	Carry out research in the areas of lithium, hydrogen adsorption and energy storage
			CO6	Pursue research on nano-chip, applications leading to communications and aerospace
	7B881 PROJECT -II		CO1	Students use the concepts learned in the courses, so far, in conceptualizing, designing and executing the projects
		CO2	Enables to apply modern tools and technologies for project works	
		PROJECT -II	CO3	Inculcates an enthusiasm to use the creative ideas to execute projects to meet the current needs of the society
			CO4	Enhances communicative skills and team work
		CO5	The students learn the ability to work as an individual with multidisciplinary approach	



# Course Outcomes of ECE Department

SREENIDHI INSTITUTE OF SCIENCE AND





#### Department of Electrical & Communication Engineering COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and regulation	Course code	Course name		Co's		
			CO1	Explain semiconductor behavior, types and their applications		
			CO2	Differentiate the wave and particle, and its application for a particle in one dimension box		
		Engineering	CO3	Explain about emission, its types, laser principle and applications of optical fibers (sensors and medical endoscopy)		
	9HC07	Engineering Physics	CO4	Reveals about the magnetism-its origin and types and its applications		
			CO5	Explain the basic concepts of dielectric materials, polarization and its types, their applications (piezo, ferro and Pyro electricity).		
			CO6	Summarize nano& bulk concepts, surface to volume ratio and its applications.		
			CO1	Explain basic fundamentals of Computer Systems, computing environments, Computer Languages – Machine Languages		
			CO2	Describe C language Programs, Structure of a C Program		
	9FC01	Problem Solving using C	CO3	Describe write programs using control structures such as Pre-test and post-test loops, while, do while, for, break		
		using C	CO4	Write programs implementing application on arrays		
			CO5	Write programs using Pointers and string handling functions		
			CO6	Write programs using Enumerated, Structure, Union types and files.		
		MATRIX ALGEBRA AND CALCULUS	CO1	Check the consistency or inconsistency of a linear system and can solve the problems.		
I-I & A22	9HC11		CO2	Find the Eigen values and Eigen vectors and can solve the problems associated with these concepts.		
			CO3	Find the nature, index and signature of the quadratic form.		
			CO4	Verify the applicability of mean value theorems and also can express the given standard function in series form using Taylor's and Maclaurin series.		
			CO5	Find the solutions of first order first degree differential equations and solve the problems on Newton's law of cooling, Natural growth and decay.		
			CO6	Solve higher order ordinary differential equations with constant coefficients using some standard methods.		
			CO1	Demonstrate competence with suitable accuracy in vocabulary, and language fluency.		
			CO2	State the definition of nouns, verbs, adjectives, and adverbs.		
	9HC01	Essential English	CO3 CO4	Identify the differences of each tense and use the tenses accurately.		
	<b>311CU1</b>	Language Skills (EELS)	C04	Identify specialized reading strategies for specific types of texts Produce written work that is substantive, organized, and		
			CO6	grammatically accurate. Demonstrate competence with suitable accuracy in vocabulary, and		
			CO1	language fluency. Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering		
	9BC01		CO2	Understand and Implement Orthographic projections and draw projections of simple drawing entities such as points Lines, and Planes		
		Engineering	CO3	Draw projections of different types of regular solids in various positions wrt principal planes of projection		

		Graphics		Draw Sections of various Solids including Cylinders, cones, prisms
		r	CO4	and pyramids and draw the developments of these solids and their sections.
			CO5	Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views
			CO6	Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software
			CO1	Describe people, objects and situations using simple sentences.
		Oral	CO2	Use appropriate tenses and expressions in different contexts of conversations.
	9HC61	Communication Lab-I	CO3	Identify major areas of concern in their oral communication and address them.
			CO4	Create a SMART plan to enhance their communication skills in English
			CO1	Demonstrate the wave length of monochromatic source of light by using Newton's Rings
		Engineering	CO2	Analyze refractive index of a material prism and Dispersive power of a glass Prism by using spectrometer
	9HC66	Physics Lab	CO3	Determine the wave length of spectral light and laser Source of light by using Diffraction Grating
			CO4	Design and Analyze RC Circuits
		CO5	Analyze RLC Series circuit and parallel circuit	
			CO6 CO1	Investigate magnetic Circuits To formulate the algorithms for simple problems
			CO1	To translate given algorithms to a working and correct program
		_	CO3	To be able to correct syntax errors as reported by the compilers
		Problem Solving using C Lab	CO4	To be able to identify and correct logical errors encountered at run time
	9FC61		CO5	To be able to write iterative as well as recursive programs
			CO6	To be able to represent data in arrays, strings and structures and manipulate them through a program
			CO7	To be able to declare pointers of different types and use them in defining self referential structures.
			CO8	To be able to create, read and write to and from simple text files.
			CO1	To understand microscopic chemistry in terms of atomic and molecular orbitals
		ENGINEERING	CO2	To learn the preparation and applications of commercial polymers and lubricant materials
1 110 422	9HC04	CHEMISTRY	CO3	To learn the industrial problems caused by water and municipal water treatment
I-II& A22			CO4	To acquire knowledge about different types of batteries and their working mechanism
			CO5	To develop the concepts and types of corrosion and the factors influence corrosion
			CO6	To understand the control methods and protective coatings for metals and other surfaces
			CO1	Design the programs using structures, unions and enum.
	9EC01	DATA	CO2	Demonstrate the concepts of Abstract data type and also applications of stacks and queues.
		STRUCTURES	CO3	Implement basic operations on single, double and circular linked list.

		CO4	Solve problems involving Binary Search trees and AVL trees.
		CO5	Articulate the concepts of graphs, heaps and hashing.
		CO6	Develop algorithms for various searching and sorting techniques and analyze their performance.
		CO1	Find the limits and test for the continuity and differentiability of a function.
		CO2	Solve the problems on multiple integrals.
	ADVANCED	CO3	Solve linear and nonlinear first order partial differential equations.
	CALCULUS	CO4	Find Series expansion a function defined over the intervals.
9НС	212	CO5	Find directional derivative, gradient, divergence and curl of a function.
		CO6	Solve problems of line, surface and volume integrals.
		CO1	Understand the principle of different methods of electrical circuit reduction.
	<b>Electrical Circuits</b>	CO2	Understand the principle of single phase A.C circuits
	& Networks	CO3	Understand the principle of magnetic circuits Understand the principles of network theorems along with its
9AC	Analysis	CO4	applications
		CO5	Understand the principle two port networks along with its applications
		CO6	Understand the principle of transients with both DC and AC excitation
			Understand the nuances of striking a great conversation in formal
	Oral	CO1	and informal situations.
9НС	C62 Communication Lab-II	CO2	Gain experience of facing an audience and speaking in public.
		CO3	Design a winning presentation and present it with ease.
		CO1	Preparation of Inorganic compounds
		CO2	Determination surface tension of a liquid
		CO3	Determination viscosity of lubricant
		CO4	Determination acid value of an oil
9НС	Engineering	CO5	Estimation hardness of water
	Chemistry Lab	CO6	Analysis the amount of chloride content
		CO7	Determination of cell constant and conductance of solutions
		CO8	Determination of redox potential and emf of solutions
		CO9	Determination of the rate constant of acid
		CO1	Write programs on structures and unions.
	Data Structures	CO2	Implement Stacks, Queues and circular queues using arrays.
9EC		CO3	Write programs to implement basic operations on various types of linked list.
		CO4	Implement insertion and traversal operations on binary search tree
		CO5 CO1	Develop programs on various searching, sorting algorithms. Use various types of conventional manufacturing Processes
		CO2	Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience
9BC	<b>61</b> Workshop/Manuf acturing	CO3	Manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.
	Processes Lab	CO4	Produce small devices / products /appliances by assembling different components

			CO1	Understand the operation of semiconductor diode
		_	CO2	Understand the Fundamentals of BJT operation,
			CO3	Understand the Fundamentals of SCR, JFET operation
II-I & A20	8CC01	Electronic Devices and Circuits	CO4	Understand the Analysis and design of Amplifier and Oscillators
			CO5	Understand the Basic regulator circuits and voltage multipliers.
			CO6	Explore the various number systems
			CO1	An ability to understand number systems and apply the rules of Boolean algebra
			CO2	An ability to simplify of Boolean expressions using K-map
			CO2 CO3	An ability to design MSI combinational circuits
	8CC02	Digital Logic Design	CO4	An ability to design basic memory units
			C05	An ability to design digital design using PLD's such as ROM's, PLA' s, PAL s.
			CO6	An ability to design digital controllers using Algorithmic State Machine Charts.
			CO1	Understand the concepts of signals, comparison of signals
			CO2	Apply the orthogonality properties to understand Fouries series and Fourier Transforms.
	8CC03	Signals and Systems	CO3	Understand the concepts of systems, their characterization in the Time as well as Transformed domains
	00000	Signals and Systems	CO4	Understand and apply the mathematical tools
			CO5	the sampling frequency for any low pass and band pass signals applying the sampling theorem.
			CO6	Distinguish between continuous and Discrete time signals and systems.
		Probability Theory and Stochastic Process	CO1	Understand the concepts of Probability, Understand concepts
			COI	of multiple random variables.
			CO2	Understand concepts of Discrete Random Variables
			CO3	Understand concepts of multiple random variables
	8C304		CO4	Understand concepts of the Mean. Auto-correlation, Auto-
				covariance and Auto-correlation
			CO5	Understand the concepts of Power Spectral Density Function of Random Process,
			CO6	Understand the concepts of Random Signal Response of Linear Systems
			CO1	Use the Laplace transforms techniques for solving ODE's
			CO2	Use the Z- Tranforms technique for solving Difference
	8HC14	Transform Techniques	CO3	equations           Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations
	011014	and Numerical Methods	CO4	Find the root of a given equation
		-	C04 C05	Estimate the value for the given data using interpolation
		F	CO6	Find the numerical solutions for a given ODE's
				This course also discusses their role in their family. It, very briefly, touches issues related to their role in the
			CO1	society and the nature, which needs to be discussed at length in one more semester for which
	8HC17	Universal Human		the foundation course named as "H-102 Universal Human Values.
		Values	CO2	Understanding Harmony is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.
			CO1	Assess themselves using SWOT analysis
		F	CO2	Appraise the importance of certain soft skills like time
		-	C02	management and goal setting           Improve their verbal ability to handle the competitive
	8HC03	Soft Skills	CO4	exams. Enhance their team skills and design thinking capabilities
				for effective problem solving and decision making Know their emotional quotient which guides their thinking,
			CO5	<ul><li>Know their emotional quotient which guides their thinking,</li><li>behavior and helps them manage stress efficiently.</li><li>Equip themselves with the prerequisites, and relevant</li></ul>
			CO6	techniques to effectively attend corporate interviews
	8CC71		CO1	Identify, Specify and test R, L, C Components (Colour Codes),

				Detentiometers Switches Coils Deleve
				Potentiometers, Switches, Coils, Relays
		Electronic	CO2	Identify, Specify and test Active Devices, Diodes, BJTs, Low power JFETs, MOSFETs.
		Devices and Circuits Lab	CO3	Describe operation of Multimeters, Function Generator and Regulated Power Supplies
			CO4	Explain and use CRO for experiments
			CO5	Explain and demonstrate working of PN Junction diode characteristics
			CO6	Explain and demonstrate working Half and Full wave Rectifier with and without filters
	Basic S	Basic Simulation	CO1	Perform basic operations on Matrices, 1D signals and sequences
	80072	Lab	CO2	Understand convolution correlation of signals and sequences in time and frequency domains
	8CC72		CO3	compute the response of LTI system for unit impulse and step
			CO4	verify the sampling theorem and Gibbs Phenomenon
	8CC73	Digital Logic Design Lab	CO1	Verify the operations of digital circuits using IC s
		2001811 2000		Assess the relevant courses they have undergone till the completion
				of that academic year. Comprehend the concepts in the core subjects
		Comprehensive		and the elective subjects, to make them ready to face technical
		Test and		interviews which improve their employability skills. They are asked
	8C364	Viva –Voce – III	CO1	to comprehend the concepts in the core subjects and the elective
				subjects, to make them ready to face technical interviews which
				improve their employability skills. Assessment is done in the
				relevant courses they have undergone till the completion of that academic year.
	Technical Seminar – III 8C365	Technical	CO1	Identify current General, political and technology related topics
		CO2	Arrange and present seminar in a effective manner.	
			CO3	Collect, survey and organize content in presentable manner.
			CO4	Demonstrate oratory skills with the aid of Power Point
				Presentations and also submit the report of the Technical seminar
			CO5	Exhibit interview facing skills and team leading qualities
			CO1	Distinguish between small and large signal amplifiers.
			CO2	Analyze and Design tuned and RF amplifiers
			CO3	Understand linear and non-linear wave shapingmethods
II-II &A20	8CC05	Analog Circuits	CO4	Understand analyze and design various types of multivibrators,
				their analysis, designing and applications
			C05	Explain different sweep generators and their applications
			C06	Analyze various types of Logic gates and Sampling gates
			CO1	Analyze and design of various continuous wave and angle
				modulation and demodulation techniques
		Analog & Digital	CO2	Understand the effect of noise present in continuous wave and angle modulation techniques.
	8CC06	Communications	CO3	Attain the knowledge about AM, FM Transmitters and Receivers
	00000		CO4	Analyze and design the various Pulse Modulation Techniques
			CO5	Understand the concepts of Digital Modulation Techniques and
			005	Baseband transmission, source coding and channel coding
			CO1	Demonstrate the concepts of Differential Amplifier and Operational
				Amplifier and their characteristics.
	80007		CO2	Design the basic circuits using Operational Amplifiers.
	8CC07	IC Applications	CO3	Explore, design and analyze Filters, Timers, Voltage Controlled Oscillator and Phase Locked Loop.
			CO4	Demonstrate the design and analyze Oscillators, D/A Converters and A/D Converters.

			CO5	Classify and characterize the various Logic Families.
			C06	Explore the design of various logic gates using CMOS logic
			CO1	Apply the Maxwell's equations in propagation of EM waves
			CO2	Demonstrate the behavior of EM waves in different media
		Electromagnetic	CO3	Understand the property of EM energy at different boundary conditions
	80408	Waves and Transmission Lines	CO4	Understand the impossibility of TEM waves in rectangular wave guides
	8C408		CO5	Design different transmission lines
			C06	Understand the concepts of high frequency dissipation less and open& short-circuited lines
			CO1	To understand the basics of Managerial Economics at Micro level, Demand analysis and production analysis in particular.
			CO2	To understand cost concept, Revenues and Market structure
			CO3	To understand and identify various basic concepts of Accounting, Double
		Economics,		entry system and Book keeping.
	8ZC01	Accountancy and Management Science	CO4	To understand the concepts of Capital expenditure, Revenue expenditure and Final accounts.
		Science	CO5	To make student understand the basics of Management, its principles and various functions performed in organization.
			C06	To make student learn about various personality traits, perception, attitudes of individuals working in organization.
			CO1	Gains exposure towards Python versions and their specifications and build programs using primitive data types
			CO2	Write applications that include functions, modules, packages along with respective exceptional handling mechanism.
			CO3	Writes applications using features of Python and applications using Files
			CO4	Hands on exposure on NumPy/Tkinter/Plotpy modules
				Analyze worst-case running times of algorithms using asymptotic
	8FC27	Python Programming concepts	CO5	analysis. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize divide and-conquer algorithms
			C06	Describe the dynamic-programming paradigm and the greedy paradigm and explain when an algorithmic design situation calls for it. Synthesize dynamic programming and greedy algorithms and analyze them
			CO1	Understand about ecosystem and energy flow among the organisms
			CO2	Know the resources available, use of them and overexploitation of the resources in the nature.
			CO3	Learn the value, use and value of biodiversity
	011005	Environmental Science and	CO4	Understand the causes and effect of pollution and implement measures in control of pollution.
	8HC05	Ecology	CO5	Understand the sustainable development and implement green technology for sustainable development
			C06	Learn and implement policy to protect the environment
			CO1	To understand the design and working of various linear and non- linear wave shaping circuits.
			CO2	To demonstrate the working principle of various multivibrators and functionalities of various logic gates
	8CC74	Analog Circuits Lab	CO3	To perform and verify the working of oscillators, feedback amplifiers and voltage regulators.
			CO4	To perform laboratory experiment to verify the conversion efficiency of various power amplifiers.
			CO1	Demonstrate the modulation and demodulation of few analog and digital modulation techniques.
	8CC75	Analog & Digital Communication	CO2	Verifying the spectral components of AM and FM&the concepts of frequency and time division multiplexing techniques
	000/3	Lab	CO3	Demonstrate the modulation and demodulation of few pulse analog, and pulse digital modulation techniques &Verifying sampling

				theorem
			CO4	Demonstrate the modulation and demodulation of digital modulation
				technique&Generation of line coding techniques.
			CO1	To explore the operating modes of IC 741 OP-AMP
		IC Applications Lab	CO2	To design applications using 741Op-Amp
	8CC76	Lab	CO3	To understand and implement applications using 555 Timers
			CO4	To design D to A converters and IC voltage regulators
	8C466	Comprehensive Test and Viva –Voce – IV	CO1	Assess the relevant courses they have undergone till the completion of that academic year. Comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills. They are asked to comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills. Assessment is done in the relevant courses they have undergone till the completion of that academic year.
			CO1	Identifycurrentgeneral, political and technologyrelated topics.
			CO2	Arrange and presentseminar in a effective manner
	00467	Technical	CO3	Collect, survey and organize content in presentablemanner
	8C467	Seminar - IV	Gold	Demonstrateoratoryskills with the aid of Power Point resentations
			C04	and also submit the report of the Technical seminar
			CO5	Exhibit interview facingskills and team leadingqualities
			CO1	Select the real-time problem in the industry.
			CO2	Analyze the requirements with respect to the problem statement
		Summer Break -	CO3	Design the optimal solution for the problem.
			CO4	Implement the solution using the apropriate modern tools
		Internship–I	CO5	Present and submit the report
III-I &A20			CO1	Distinguish between CT and DT signals and systems and understand the growing need of DSP and study the concepts of discrete time signals and systems.
		Digital Signal Processing	CO2	Represent periodic DT signals as a Fourier series; non-periodic DT signals as a Fourier Transform and use a powerful mathematical tool called DFT
	8CC09		CO3	Compute the Fourier Transform of DT signals using the FFT algorithms.
			CO4	Realize a digital filter in several forms and structures for a given transfer function $H(z)$ .
			CO5	Distinguish IIR and FIR filters; Design each type by several methods once the desired specifications are given.
			CO6	Understand the need and implement the multirate sampling techniques.
			CO1	Understand the existing device technologies and IC fabrication process
		VLSI Technology	CO2	Explore and analyze the electrical properties of the devices of CMMOS device.
	8C510	and Design	CO3	Design basic logic gates, combinational and sequential circuits using CMOS logic.
			CO4	Analyze the effects of parasitic on IC power and performance.
			CO5	Design memory cells and basic data path units.

			CO6	Explore the need for testing and design verification of VLSI circuits.
			C00	Understands the Architecture of 8086.
			COI	Onderstands the Architecture of 8000.
			C02	Understand instructions of 8086 and to write Assembly Language Programs
		Microprocessors	CO3	Interface I/0 devices with 8086
	8DC05	and Microcontrollers	CO4	Understand Architecture of 8051 microcontroller
			CO5	Understand instructions of 8051 and to Interface I/0 devices with 8051
			C06	Understand the need of advanced processors
			CO1	Understand the working principle and limitations/advancements of conventional mobile telephone systems, cellular mobile systems and Advanced generations of cellular wireless systems
			CO2	Analyze Frequency reuse concept and avoidance of Co-channel interference.
	8C511	Cellular and Mobile	CO3	Explore the concepts of adjacent channel interference, its effects and avoidance mechanism.
	00011	Communication	CO4	Analyze signal reflections, path loss, propagation delay/loss, near and long distance propagation loss under different conditions, Merits of Lee model
			CO5	Analyze frequency allocation of cellular systems
			CO6	Demonstrate the concept of handoff mechanism and dropped calls.
			CO1	Learning the radiation mechanism of antenna and antenna parameters
			CO2	Design and analyze wire antennas and antenna arrays
		Antennas and	CO3	Evaluate knowledge on Horn, Parabolic and Lens antennas.
	8C512	Wave	CO4	Analysis of Horizontal Polarized antennas, Helical antennas, Patch
	00312			antennas etc.
		Propagations	CO5	Understand the propagation mechanisms of ground wave, sky wave
				and space wave concepts.
			CO6	Analyzetheconcepts of sky wave propagation .
			CO1	Understand levels of design description, concurrency, simulation and synthesis.
		Digital Design	CO2	Apply language constructs, data types, operators available in verilog HDL.
	8C517	Digital Design Through Verilog	CO3	Design combinational logic and sequential logic in gate level modeling.
			CO4	Explain Gate and Switch level modeling.
			CO5	Use system tasks, functions and UDPs.
			CO6	Demonstrate SM charts and realize digital design using SM charts.
			CO1	To analyze the internal architecture of the computer
	8CC18	Advanced Computer	CO2	Understand the different data types and instruction set, of the computer
		Architecture	CO3	Understand the memory structure of the computer and learn CISC & RISC
			CO4	Understand processor structure and function and know the input output interfacings
	8C519	Digital Image &	CO1	Gets the knowledge of the basic step in image processing system, Discrete cosine transforms and discrete wave let transforms.

		Video Deres '	1	Differentiate impact on the second se
		Video Processing	CO2	Differentiate image enhancement methods, different types of spatial domain and frequency domain methods.
			CO3	Get the knowledge of point, line and edge detection, thresholding, Region based segmentation.
			CO4	Differentiate different types of redundancies, lossy and lossy less image compression, different types of coding techniques.
			CO5	Know the difference between analog video and digital video, different types of image formation and sampling of video signals
			CO6	Study the different types of motion estimation techniques and application of motion estimation in video coding.
			CO1	Explain different kind of networking models
			CO2	Define different addressing schemes for networks.
		Information Theory and	CO3	Detailed idea of data link layer protocol and medium access protocol
	8C520	Coding Techniques	CO4	Gain the knowledge of router configuration and network layer protocols and their working.
	Techniques		CO5	Differentiate the IPv4 and IPv6 addressing schemes for different networks.
			CO6	Gain the knowledge of application layer protocols like DHCP, DNS.
			CO1	Describe basic concepts of image processing system.
			CO2	Summarize and compare various digital image transform techniques.
	8C521	Digital Image Processing	CO3	Demonstrate and survey digital image enhancement in practical applications.
			CO4	Analyze the case study related to various techniques of
		CO5	image restoration. Apply compression techniques on digital image.	
			CO1	Explore to write the Assembly Language Programs using Arithmetic instructions of 8086
		Microprocessors	CO2	Explore to write the Assembly Language Programs using String instructions of 8086
	8DC71	and Microcontrollers	CO3	Explore to write the Assembly Language Programs for I/O interface with 8086
		Lab	CO4	Explore to write the Assembly Language Programs using Arithmetic instructions of 8051
		vLSI Technology	CO5	Explore to write the Assembly Language Programs using Timers and interrupts of 8051
			CO1	An ability to use VLSI CAD Tools (NGSPICE, Xilinx, and Cadence).
			CO2	An ability to understand and implement digital logic gates and circuits using SPICE and Verilog HDL.
	8C577		CO3	An ability to perform physical design- layouts using Cadence EDA Tool.
	and Design Lab	CO4	An ability to implement combinatorial and sequential designs on FPGA boards (SPARTAN 3) using Xilinx tools.	
			CO5	An ability to use VLSI CAD Tools (NGSPICE, Xilinx, and Cadence).

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			CO1	Apply knowledge for computer assembling and software installation and ability to solve the trouble shooting problems
			CO2	Apply the tools for preparation of PPT, Documentation and budget sheet etc
	8FC72 Python Programming Lab		CO3	Install and run the Python interpreter, Create and execute Python programs
		CO4	Apply the best features of mathematics, engineering and natural sciences to program real life problems	
			CO5	Describe the Numbers, Math functions, Strings, List, Tuples and Dictionaries in Python, Express different Decision Making statements and Functions, Interpret Object oriented programming in Python
			CO6	Understand and summarize different File handling operations, explain how to design GUI Applications in Python
			CO1	Select the real-time problem in the industry.
			CO2	Analyze the requirements with respect to the problem statement
	8C591	Summer Industry	CO3	Design the optimal solution for the problem.
	8FC24 Cyber Security	Internship-1	CO4	Implement the solution using the apropriate modern tools
		CO5	Present and submit the report	
		CO1	The students will be able to understand cyber-attacks, types of cybercrimes.	
		CO2	Realize the importance of cyber security and various forms of cyber attacks and countermeasures	
			CO3	Get familiar of cyber forensics
		CO4	Get familiar with obscenity and pornography in cyber space and understand the violation of Right of privacy on Internet	
			CO5	Cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks
			CO6	Elucidate the various chapters of the IT Act 2008, power of Central and State Government to make rules under IT Act 2008
-   & A20		CO1	Classify network topologies and apply the same to different networks with the knowledge acquired from the network reference models and fundamentals of computer networks	
			CO2	Illustrate the design issues of data link layer and detect the transmission errors and flow control problems
	8EC47	Computer Networks	CO3	Categorize the Channel allocation issues, MAC protocols such as ALOHA, CSMA and CSMA/CD and MAC addresses with IEEE 802.X and wireless LAN
			CO4	Distinguish the knowledge of the several routing algorithms and Internetworking concepts
			CO5	Obtain and use the skills of subnetting and routing mechanisms

			CO6	Distinguish the knowledge of the functions of transport and application layer
			CO1	Distinguish microwave frequencies and analyze Rectangular and circular wave guides.
	Microwave and 8C613 Optical Communicatio	Microwaye and	CO2	Formulate various passive components with the help of scattering matrix
			CO3	Explore different linear beam tubes
		-	CO4	Analyze Cross field tubes and slow wave structures.
		Communications	CO5	Analyze the propagation of light in optical fibers and to characterize various optical sources.
			CO6	Understand the principle of various Losses, Dispersion and to characterize various Optical Detectors.
			CO1	Learn the distinction between optimal reasoning Vs human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
			CO2	Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.
	8EC45	Artificial Intelligence	CO3	Learn different knowledge representation techniques.
		0	CO4	Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and spacecomplexities.
			CO5	Comprehend the applications of Probabilistic Reasoning and Bayesian Networks
			CO6	Analyze Supervised Learning Vs. Learning DecisionTrees
			CO1	Learn basic concepts of control systems.
			CO2 CO3	Study about time response analysis.         Learn basic concepts of stability and root locus method.
	8AC07 Linear Control system	Linear Control	005	Learn basic concepts of stability and root focus method.
		CO4	Study about frequency response analysis.	
			CO5	Learn basic concepts stability analysis in frequency domain.
			CO6	Learn fundamentals of state space analysis.
			CO1	Understand the concepts of Switched capacitors Circuits
			CO2	know the concepts of PLLS
	8C623 Analog and Mixed Signal Design (PE- II)	CO3	study concepts of Data Converter Fundamentals	
		Signal Design (PE-	CO4	Explore the concepts of Nyquist Rate A/D Converters and develop its applications
			CO5	Understand concepts of the Oversampling Converters and Continuous-Time Filters
		CO6	Understand concepts of concepts of Continuous-Time Filters, CMOS Trans conductors	
	8C624	Embedded C	CO1	Demonstrate the use of development software for a particular application and choosing appropriate OS.

		<b>D</b>	000	
		Programming	CO2	Understanding and building basic embedded system using
		(PE-II)	CO3	8051.Understanding its design Design of embedded systems and implementation of switch reading.
			C03	Demonstrate the concepts of OOP's theory inheritance and
			C04	functions in embedded C to support modular programming.
			CO5	Learning the need for realtime implementation in Embedded C
			CO5	Case study of 'Intruder Alarm' toachihve real time hands on.
			C01	
				Use the Laplace transforms techniques for solving ODE's
			CO2	Use the Z- Tranforms technique for solving Difference equations
	8C625 Transform 8C625 Techniques (PE- II)		CO3	Form partial differential equations and find the solution to first order linear and nonlinear partial differential equations
		CO4	Find the root of a given equation	
		CO5	Estimate the value for the given data using interpolation	
			CO6	Find the numerical solutions for a given ODE's
			CO1	An ability to make system-level decisions for software-defined radio technology and products
			CO2	An ability to implement smart antenna algorithms
	8C626 Software Defined Radio(PE-II)		CO3	Knowledge of digital hardware architectures and understanding of development methods
			CO4	An understanding of middleware in SDR
			CO5	Understanding of analog RF components
			CO6	Understand the basic principles of Cognitive Radio
			CO1	Understand the concepts of Artificial Intelligence
		8C627 Artificial Neural Notworks (PF II)	CO2	Illustrate the concepts of Artificial Neural system
	8C627		CO3	Illustrate computer vision
	8C627 Networks (P)	Networks (PE-II)	CO4	Explain Probabilistic models and neural networks
			CO5	Illustrate concept Neural language
			CO6	Explain applications of Neural networks
			CO1	Demonstrate the orbital mechanics.
			CO2	Design the satellite subsystem.
	Satellite 8C628 Communications (PE-II)	CO3	Estimate the C/N and able to measure the relevant values.	
		CO4	Evaluate the satellite link.	
		CO5	Recall Multiple access concepts and discuss earth station technology	
			CO6	Apply the knowledge of GPS in real time applications.
	0005		CO1	Define the characteristics and analyze the errors of measurement systems
	8CC51	8CC51 Electronics and Instrumentation(O E-I)	CO2	Select the appropriate passive or active transducers for measurement of physical phenomenon
		<b>.</b>	CO3	Relate and apply the appropriate measuring techniques to real time applications

			Interpret the usage of DVM, Spectrum Analyzer and DSO
		CO4	instruments for appropriate measurements
		CO5	Develop an understanding of construction and working of different AC and DC bridges and their applications
		CO1	To understand number systems and apply the rules of Boolean algebra to simplify Boolean expressions using theorems and K-maps.
		CO2	To design combinational circuits such as full adders, multiplexers, decoders, encoders. Code convertersetc
8CC56	Fundamentals of digital circuits &	CO3	To design basic memory units (latches and flip-flops) and sequential circuits
	Microprocessors	CO4	To understand Architecture of 8086 and analyzing in single mode and in multi processor mode.
		CO5	To understand instructions of 8086 and to write Assembly Language Programs.
		CO6	To understand instructions of 8086 and to write Assembly Language Programs
		CO1	Understand the design of dipole antenna for various frequencies.
		CO2	Understand the design of monopole antenna for variation in radius
	Antenna		of the wire
8C678	Simulation Lab	CO3	Design of Microstrip patch antenna in different shapes
	Simulation Lab	CO4	Understand the design of standard horn antenna
		CO5	Analyze the characteristics of yagi-uda antenna
		CO6	Verify the radiation pattern of different types of antenna
		CO1	Implement and analyze framing methods of data link layer
		CO2	Implement and analyze framing methods of data link layer.
8EC65	Computer	CO3	Illustrate and implement error detection & correction techniques
OECU5	Networks Lab	CO4	Implement different Routing Algorithm
		CO5	Understand basic Network Commands
		CO6	Use of Wireshark and NS-2 tools
		CO1	To Understand the frequency response of a given systems
	Digital Signal	CO2	Design of FIR & Butterworth and chebyshev approximations and converting them to IIR filters
8CC79	Digital Signal Processing Lab	CO3	Transforming an analog filter to its digital equivalent
	LIGGODING Dau	CO4	Sampling rate conversion Interpolation and decimation
		CO5	An ability to use TMS320c6713 for different algorithms
		CO1	To Understand the frequency response of a given systems
		CO1	Use the concepts, in conceptualizing, designing and executing the modules of the projects
		CO2	Exhibit the interest in learning the modern tools and technologies.
8C692	Group Project	CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects
		CO4	Improve communicative skills and team working skills

	8C668	Comprehensive Viva Voce	CO1 CO1	Assess the relevant courses they have undergone till the completion of that academic year. Comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills. They are asked to comprehend the concepts in the core subjects and the elective subjects, to make them ready to face technical interviews which improve their employability skills. Assessment is done in the relevant courses they have undergone till the completion of that academic year. Classify network topologies and apply the same to different
N/ 1			01	networks with the knowledge acquired from the network reference models and fundamentals of computer networks
IV-I	7EC05	Computer	CO2	Illustrate the design issues of data link layer and detect the
&	712005	networks		transmission errors and flow control problems
A18		networks	CO3	Categorize the Channel allocation issues, MAC protocols such as ALOHA, CSMA and CSMA/CD and MAC addresses with IEEE 802.X and wireless LAN.
			CO4	Distinguish the knowledge of the several routing algorithms and Internetworking concepts
			CO5	Obtain and use the skills of subnetting and routing mechanisms
			CO1	Distinguish the knowledge of the functions of transport and application layer
			CO1	Distinguish microwave frequencies and analyze Rectangular and circular wave guides.
		Microwave and	CO2	Formulate various passive components with the help of scattering matrix
	7C714		CO3	Explore different linear beam tubes
	/C/14	Optical Communications	CO4	Analyze Cross field tubes and slow wave structures.
		Communications	CO5	Analyze the propagation of light in optical fibers and to characterize various optical sources.
			CO6	Understand the principle of various Losses, Dispersion and to characterize various Optical Detectors.
			CO1	Students will understand the nature of Entrepreneurship and its
		Entrepreneur -		importance
	7ZC19	ship, project	CO2	Will gain knowledge regarding project, its life cycle and
		management and		organization
		structured	CO3	Will gain knowledge relating to project formulation and
		finance	CO4	implementation           Comprehend the components of structured finance
			C04	Establish a framework of CMBS
			CO6	Students will gain knowledge relating to the CRE Servicing
			C01	Students will learn basics of databases and understand the
			CO2	architecture of database management systems. Students will learn about good database design techniques and
	7FC23	Database		database theories behind.
		systems	CO3	Understand conceptual database designs, and functional dependencies and normalization.
			CO4	Students will understand the Mathematical foundation for relational databases.
			CO5	Student will be able to understand concept of Constraints, Views
			<u> </u>	and will be able to create dynamic databases.
	77.020	Advanced	CO6	Learn transaction management, concurrency controls. The Students' gain knowledge on the stages of Startup and the
	7ZC30	Advanced	CO1	turbulence environment it undergoes and the stages related to

	Entrepreneur -		growth of the Startup.
	ship	CO2	The Students are exposed to the various business models and
	Smp		critically evaluating the effectiveness of the business models and products
		CO3	The students understand the method of business traction, create roles and build their A- team
		CO4	The students understand the various channels of revenue building and exploration of new revenue avenues.
		CO5	The students understand the need of sales planning and people plan and also financial modeling
		CO6	The students are exposed to the legal implications affecting the company's prospects and identifying right mentors and advisors to support startups
		CO1	Comprehend knowledge relating to the conservation of the environment.
7ZC20	6 Ecology and disaster	CO2	Learn about bio-diversity and climatic changes occurring in the environment.
	management	CO3	Know about the international treaties, conventions and organizations active in the field of environmental protection.
		CO4	To provide students an exposure to disasters, their significance and types.
		CO5	To enhance awareness of institutional processes in the country
		CO6	To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
7CC3	68 Communications Theory	CO1	Demonstrate the principle of converting analog signal to digital by using PCM, DM,ADM systems.
		CO2	Explore baseband transmission and optimal reception of digital signals using different filters and M-ary Error Probabilities.
		CO3	Design and compare ASK,PSK,FSK,DPSK,QPSK modulators and demodulators .
		CO4	Demonstrate the concepts of information theory, source coding techniques ,channel capacity and can find channel capacity and coding efficiency.
		CO5	Demonstrate encoding and decoding techniques of different channel coding techniques like ,block codes, cyclic codes, convolutional codes.
		CO6	Explore the knowledge on different types of spread sprectrum modulation techniques, DSSS, FHSS, CDMA and PN sequence. and OFDM
7AC44	Fundamentals of measurements& instrumentation	CO1	Understand the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. The student demonstrates the ability to compensate for the errors in the instruments and to extend the range of the instruments.
		CO2	Demonstrates the knowledge of Potential and Current transformers; the errors in them and the effect of having an open/short in the secondary circuits; Understand the principle of operation of Dynamometer and Moving-iron type of Power factor meters.
		CO3	Comprehends the principle of operation of dynamometer type of Wattmeter and Induction type of Energy meter; use the wattmeter to measure the Active and Reactive power and demonstrates the ability to extend the range of them.
		CO4	Identify and use different techniques of measurement of Resistance, Inductance and Capacitance values.
		CO5	Understand the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers and Cathode ray Oscilloscope.

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		CO6	Demonstrates the ability in characterizing the different types of
			transducers and uses them to measure Strain, Gauge Sensitivity,
			Displacement, Velocity, Acceleration, Force, Torque and
		CO1	Temperature.
		CO1	Formulate and solve mathematical model (linear programming
			problem) for a physical situations like production, distribution of goods and economics.
	PRINCIPLES	CO2	Recognize and Solve the problem of transportation involving a large
7BC53	OF	002	number of shipping routes with least transportation cost and
	OPERATIONS		generate optimal assignment strategy for different situations
		CO3	Use Johnson's rule to create the optimal sequencing schedule for a
	RESEARCH	005	sequencing problem and make decisions about replacing an item
			using replacement policy
		CO4	Analyze the performance measures of Queing system and Calculate
			the EOQ for minimizing the total inventory cost
		CO5	Apply simulation techniques for solving various types of problems
			and general idea development about Markov chains
		CO1	Ability to understand the need for manufacturing processes and
			various material properties
		CO2	Ability to understand the principle of casting, Patterns used, Pattern
	PRINCIPALS		allowance and Gating systems used in casting, and various casting
	OF		methods
7BC52	MANUFACTUR	CO3	Ability to understand the basic principle of welding and distinguish
	ING	<i></i>	between various welding types and their applications
	PROCESSES	CO4	Ability to understand the principles of metal working, various types
	11002000		of metal working techniques, Knowledge of hot working and cold
			working, Ability to understand the bulk deformation processes of rolling,
		CO5	Ability to understand the bulk deformation processes of extrusion
		005	and forging, their applications and forces involved in these
			operations
		CO6	Ability to understand and distinguish the various press working
		000	operations with respect to their applications, advantages and
			disadvantages, understand the various types of plastics and their
			processing techniques
		CO1	Demonstrate advanced knowledge in the MOS Design
		CO2	Static and dynamic characteristics of CMOS to design and to
			develop the Digital Integrated Circuits for different Applications. •
	CMOS		The concepts of Semiconductor Memories, Flash Memory, RAM
7C719	Digital IC		array organization.
	Design	CO3	Analyze complex engineering problems critically in the domain of
	8	~~ ·	CMOSDigital Integrated Circuits for conducting research.
		CO4	Solve engineering problems for feasible and optimal solutions in the
		005	corearea of CMOS Digital ICs.
		CO5	Apply the CMOS Digital IC concepts for usage of modern CAD
		CO4	tools andtheir Limitations.
		CO6	The student will be able to understand the MOS Design. • In this course, students can study Combinational MOS Logic Circuits and
			Sequential MOS Logic Circuits. • Another main object of this
			course is to motivate the graduate students to design and to develop
			the Digital Integrated Circuits for different Applications.
		CO1	Gains exposure towards Python versions and their specifications.
	Embedded	CO2	Build programs using primitive data types.
7C720	Python	CO2	Construct and use data structures for various applications
	Programming	CO4	Write applications that include functions, modules, packages along
		204	with respective exceptional handling mechanism.
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		CO5	Write applications using Files – access and mnipulate
		CO5	Write applications using OO features of Python
		C00	Understand the concepts of DFT,FFT digital filters
		CO1 CO2	Illustrate the concepts of Computational Accuracy in DSP
		02	Implementations
	DSP	CO3	Explain the Architectures for Programmable DSP Devices:
	Processors	CO4	Explain the Architectures for Hogrammable DSF Devices.
7C721	and	C04	Distinguish Analog Devices Family of DSP Devices .
	Architectures	CO6	Illustrate Interfacing Memory and I/O Peripherals to Programmable
	in chitectures	000	DSP Devices
		CO1	Explain wireless communication systems and Modern wireless
			communication systems with examples.
	Wireless	CO2	Characterize Multiple Access Techniques for Wireless
7CC22	Communications		Communication and calculate capacity of cellular systems.
10022	and Networks	CO3	Explain Traffic routing in wireless networks, Wireless data services,
			Common channel signaling.
		CO4	Describe about Mobile IP And Wireless Access Protocol
		CO5	Develop different Wireless LAN protocols
		CO6	Define About Fundamentals Of 3G Services, Its Protocols And
			Applications.
		CO1	Understand the UVM concepts
		CO2	Explore the class instances and functions
7C723	Digital Design	CO3	Comprehend the UVM Configurations
	and Verification	CO4	Analyzing UVM sequences and Modeling in UVM
	with System	CO5	Developing Reusable Test benches using UVM
	Verilog	CO6	Analyzing the Case studies of Layered test bench for SPI, APB and AXI.
		CO1	Understand the basic architecture of Embedded System and their classification.
7C724	Embedded	CO2	Explore the architecture of ARM processor.
	System Design	CO3	Understand the addressing modes and data processing instructions of ARM processor.
		CO4	Understand the ARM thumb instruction set and its capabilities.
		CO5	Use both assembly and C language based ARM programming.
		CO6	Explore the memory management techniques in ARM.
7C725	Artificial Neural	CO1	Understand the concepts of Artificial Intelligence
	Networks	CO2	Illustrate the concepts of Artificial Neural system
		CO3	Lustrate computer vision
		CO4	Explain Probabilistic models and neural networks
		CO5	Illustrate concept Neural language
		CO6	Explain applications of Neural networks
		CO1	An ability to make system-level decisions for software-defined radio technology and products
7C726		CO2	An ability to implement smart antenna algorithms
10140	Software defined	CO3	Knowledge of digital hardware architectures and understanding of
	radio		development methods
		CO4	An understanding of middleware in SDR
		CO5	Understanding of analog RF components
		CO6	Understand the basic principles of Cognitive Radio
		CO1	Implement and analyse framing methods of data link layer.
	COMPUTER	CO2	Implement and analyse framing methods of data link layer.
7EC75	NETWORKS	CO3	Illustrate and implement error detection & correction techniques.
	LAB	CO4	implement different Routing Algorithm.
		CO5	Understand basic Network Commands.
1	1		1

			CO6	Use of Wireshark and NS-2 tools
			C01	Understand the design of dipole antenna for various frequencies.
		ANTENNA	CO2	Understand the design of monopole antenna for variation in radiu
	7C781	SIMULATION	202	of the wire
	10101	LAB	CO3	Design of Microstrip patch antenna in different shapes
			CO4	Understand the design of standard horn antenna
			CO5	Analyze the characteristics of yagi-uda antenna
			CO6	Verify the radiation pattern of different types of antenna
			C01	Analyze the characteristics of RKO and GUNN diode
		Micro Wave and	CO2	Understand the principles governing attenuation and working of DC
	7C782	Optical	CO3	Measure the K, S, Z and f at microwave frequencies.
	10102	Communications	CO4	Analyze the design principles of circulator and magic Tee
		Lab	C04	Understand the basic characteristics of LED and LASER
		Lau	CO5	Measure the DR,NA and Losses for Digital and Analog Links
			C00	Students identify vast application areas for mobile / wireless
			COI	communication / computing.
	7C764	Project -I	CO2	They also understand the working principle of GSM technology.
		<b>.</b>	CO3	Students understand various media access control methods that an
				meant for wireless communication, each methods' pros and cons
			CO4	Understand the issues in the Network layer in the wireless
				communication and identifying suitable solutions for the same
			CO5	Understand the issues in the Transport layer in the wireles
			<b>G</b> Q (	communication and identifying suitable solutions for the same
			CO6	Understand MANETs with an example like Bluetooth technology.
			CO7	Understand Security Issues related to mobile computing and variou
			CO8	solutions to mitigate the security problems. Prepare for the Project Phase_II
			C08	Select the real-time problem in the industry.
			CO1 CO2	Analyze the requirements with respect to the problem statement
	7C662	Commenter Instance	CO2	Design the optimal solution for the problem.
		Summer Industry Internship – II	CO3	Implement the solution using the appropriate modern tools.
		Internship – II	C04	Present and submit the report
				Select the real-time problem in the industry.
			CO6 CO1	Learn the distinction between optimal reasoning Vs human lik
			COI	reasoning and formulate an efficient problem space for a problem
		ARTIFICIAL		expressed in natural language. Also select a search algorithm for
	7EC20	INTELLIGENCE		problem and estimate its time and space complexities.
			CO2	Apply AI techniques to solve problems of game playing, theorem
				proving, and machine learning.
			CO3	Learn different knowledge representation techniques.
			CO4	Understand the concepts of state space representation, exhaustive
				search, heuristic search together with the time and space
				complexities.
			CO5	Comprehend the applications of Probabilistic Reasoning and
			COC	Bayesian Networks.
			CO6	Analyze Supervised Learning Vs. Learning DecisionTrees
IV-II	7ZC15	FINANCIAL	CO1	This unit enables the students to understand the financial structure and the financial sector reforms after 1991.
&		INSTITUTIONS	CO2	The unit gives the exposure on the role of RBI and the Regulating
A18		MARKETS	02	and credit policies adopted by the RBI.
		AND	CO3	The students get awareness on the role of Non-Banking financi
		SERVICES		institutions and the role of financial institutions in India.
			CO4	The unit educates the students to know the role of regulatory bodi
				like SEBI and also to know the capital and money marked

				instruments
			CO5	The unit equips the students to understand about the asset fund
			COJ	based financial services
			C06	The students will get exposure about the investment banking and
			CO6	merchant banking.
-		ODEDATING	CO1	
	7EC67	OPERATING	CO1	Describe the basic functionalities and structure of the Operating
		SYSTEMS	GOG	System
		CONCEPTS	CO2	Explain the concepts and implementations of: Processes, Process
				Scheduling. Describe, contrast and compare various types of
			GOA	Operating systems like Windows and Linux.
			CO3	Comprehend the concepts of Synchronization and Deadlocks in the
				Operating System
			CO4	Discuss the concepts of Memory Management(Physical and Virtual memory)
			CO5	Explain the concepts of File System with regard to directory and
			005	disk management algorithms.
			CO6	Students understand the concepts of I/O systems, protection and
			000	security in a case study given
-	7ZC24	INNOVATION	CO1	The students gain the knowledge on the inputs required for
	12024	& DESIGN	001	innovation and also gain familiarity on Entrepreneurship.
		THINKING	CO2	The students will get exposure on creative methods of ideation and
		ITHINKING	002	the importance of protecting the ideas.
			CO3	The students gain knowledge on design thinking and types of
			005	thinking.
			CO4	The students gain familiarity on emerging technologies like Internet
				of things (IoT).
			CO5	The students understand the process of building the startup.
			CO6	The students gain knowledge on various startup funding and also to
				branding building for the startup.
	7CC39	Introduction to	CO1	Understand levels of design description, concurrency, simulation
		VLSI and		and synthesis.
		Embedded	CO2	Apply language constructs, data types, operators available in verilog
		Systems		HDL.
		~;;~~~	CO3	Design combinational logic and sequential logic in gate level
			CO4	modeling. Demonstrate the use of development software for a particular
			C04	application and choosing appropriate OS.
			COS	Understanding and building basic embedded system using
			CO5	Understanding and building basic embedded system using 8051 Understanding its design
				8051.Understanding its design
-	74045	Fundamentals of	CO6	8051.Understanding its design Design of embedded systems and implementation of switch reading.
	7AC45	Fundamentals of		8051.Understanding its design Design of embedded systems and implementation of switch reading. Understand the role and potential of new and renewable energy
	7AC45	renewableenergy	CO6	8051.Understanding its design Design of embedded systems and implementation of switch reading. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on
	7AC45		CO6	8051.Understanding its design Design of embedded systems and implementation of switch reading. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the
-	7AC45	renewableenergy	CO6	8051.Understanding its design Design of embedded systems and implementation of switch reading. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be
-	7AC45	renewableenergy	CO6 CO1	8051.Understanding its design Design of embedded systems and implementation of switch reading. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.
	7AC45	renewableenergy	CO6	8051.Understanding its design Design of embedded systems and implementation of switch reading. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation. Demonstrates the knowledge of different techniques of solar
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	7AC45	renewableenergy	CO6 CO1 CO2	8051.Understanding its design Design of embedded systems and implementation of switch reading. Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation. Demonstrates the knowledge of different techniques of solar
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	7AC45	renewableenergy	CO6 CO1 CO2	<ul> <li>8051.Understanding its design</li> <li>Design of embedded systems and implementation of switch reading.</li> <li>Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.</li> <li>Demonstrates the knowledge of different techniques of solar collection and storage.</li> <li>The student becomes familiar with the different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same. The student also demonstrates the knowledge of different Bio-gas digesters and factors influencing its yield.</li> </ul>
	7AC45	renewableenergy	CO6 CO1 CO2 CO3	<ul> <li>8051.Understanding its design</li> <li>Design of embedded systems and implementation of switch reading.</li> <li>Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.</li> <li>Demonstrates the knowledge of different techniques of solar collection and storage.</li> <li>The student becomes familiar with the different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same. The student also demonstrates the knowledge of different Bio-gas digesters and factors influencing its yield.</li> <li>Aware of the potential of geothermal energy in India and will be able to characterize different types of geothermal wells.</li> </ul>
	7AC45	renewableenergy	CO6 CO1 CO2 CO3	<ul> <li>8051.Understanding its design</li> <li>Design of embedded systems and implementation of switch reading.</li> <li>Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.</li> <li>Demonstrates the knowledge of different techniques of solar collection and storage.</li> <li>The student becomes familiar with the different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same. The student also demonstrates the knowledge of different Bio-gas digesters and factors influencing its yield.</li> </ul>

			001	
			CO6	Demonstrates the knowledge of Direct Energy Conversion in
				different phenomena viz., Joule Thomson effect, Seebeck effect, Peltier effect etc. and the principle of operation of Fuel Cells.
-		PRINCIPALS	CO1	Understand a production system, principles of automobile
			CO1 CO2	understand the methods of work part transfer mechanical buffer
	7BC55	OF	002	storage control functions
		AUTOMATION	CO3	understand the implementation of automated flow lines
		AND	CO3	know the analysis and design of material handling systems,
		ROBOTICS	04	automated guided vehicle system
		110201100	CO5	understand adaptive control systems and Applications.
			CO6	understanding the business process Engineering. Concept of
			000	concurrent Engineering, techniques of rapid prototype.
_	7C827	Digital Design	CO1	Understand the UVM concepts
		and Verification	CO2	Explore the class instances and functions
		with Universal	CO3	Comprehend the UVM Configurations
		Verification	CO4	Analyzing UVM sequences and Modeling in UVM
		Methodology	CO5	Developing Reusable Test benches using UVM
			CO6	Analyzing the Case studies of Layered test bench for SPI, APB and
			-	AXI.
			CO1	Understand the Basic concepts of UNIX operating Systems and
				files, commands usage.
		EMBEDDED	CO2	Understand the Real time Systems concepts and classification of
		REAL TIME		Real time systems.
	7C828	OPERATING	CO3	Design concepts of scheduling algorithms and its applications.
		SYSTEMS	CO4	Understand the Interprocess communications and its applications in
			COF	Real time systems. Understand the Exceptional handling and Interrupts and Timers
			CO5 CO6	Understand the case study of RTOS.
-	7CC29	Artificial	C00	Demonstrate fundamental understanding of the history of artificial
	/CC29		COI	intelligence(AI) and its
		Intelligence	CO2	foundations
			CO3	Apply basic principles of AI in solutions that require problem
				solving, inference, perception, knowledge representation,
				and learning.
			CO4	Demonstrate awareness and a fundamental understanding of Expert
				Systems and its applications
			CO5	Demonstrate fundamental understanding of models of machine
			001	learning.
	70020	Q - 4 - 11:4	CO6	Apply basic principles of Supervised learning
	7C830	Satellite	CO1 CO2	Demonstrate the orbital mechanics.
		Communications	CO2 CO3	Design the satellite subsystem. Estimate the C/N and able to measure the relevant values.
			CO3	Evaluate the satellite link.
			C04 C05	Recall Multiple access concepts and discuss earth station technology
			CO3	Apply the knowledge of GPS in real time applications.
-	7C831	Radar	C00	Recognise the basics of Radar systems and its applications and its
	/0001	Communications	COI	frequencies (Understand)
		Communications	CO2	Differentiate the Radar parameters, how it affects the Range
			001	measurement. (Analyse)
			CO3	Recall the Doppler Effect, and draw backs of CW radars.
				(Remember)
			CO4	Discuss the basic concepts of Moving target indicators and evaluate
				the draw backs of MTI Radars.(Understand)
			CO5	Differentiate concept of scanning and tracking. (Analyse)
			CO6	Understand various types of displays and different phased arrays.

7C832	Mixed Signal	CO1	Understand the concepts of Switched capacitors Circuits
70052	Design	CO2	know the concepts of PLLS
	Design	CO3	study concepts of Data Converter Fundamentals
		CO4	Explore the concepts of Nyquist Rate A/D Converters and develop
		0.04	its applications
		CO5	Understand concepts of the Oversampling Converters and
			Continuous-Time Filters
		CO6	Understand concepts of concepts of Continuous-Time Filters,
			CMOS Trans conductors
7C833	System On-chip	CO1	Know basics of System Architecture
	Architecture	CO2	Understand the various types of Processors like VLIW Processors,
			Superscalar Processors.
		CO3	Distinguish Cache memory and Multilevel Caches, SOC external
		004	memory.
		CO4	Know the Concept of Inter Connect Architectures, SOC Standard Buses and Reconfiguration Technologies.
		CO5	Know the concepts and issues related to Interconnect Configuration.
		CO5	Explore the SOC Design approach and develop its applications.
7C834	Machine Learning	C01	introduce basic concepts and techniques of Machine Learning
/0054	Machine Leanning	CO1	have a thorough understanding of the Supervised and Unsupervised
		002	learning techniques
		CO3	study the various probability based learning techniques
		CO4	analyze the dimensionality reduction models
		CO5	Tunderstand graphical models of machine learning algorithms
		CO6	Apply analytical learning algorithms
		CO1	OFDM's transceiverarchitecture
		CO2	The problem of PAPR and how to reduce the PAPR.
7C835	5G	CO3	To understand how the OFDM receiver performssynchronization
	Communications	CO4	Channel modeling and propagation
		CO5	MIMO Capacity, space-timecoding
		CO6	Massive MIMO and mmWave MIMO technologies for 5G
		CO1	Identify vast application areas for mobile / wireless communication /
			computing.
		CO2	They also understand the working principle of GSM technology.
		CO3	Students understand various media access control methods that are
7C865	PROJECT II		meant for wireless communication, each methods' pros and cons
		CO4	Understand the issues in the Network layer in the wireless
		007	communication and identifying suitable solutions for the same
		CO5	Understand the issues in the Transport layer in the wireless
		CO6	communication and identifying suitable solutions for the same Understand MANETs with an example like Bluetooth technology.
		000	Identify vast application areas for mobile / wireless communication /
			computing.
1			computing.



# Course Outcomes of CSE Department

SREENIDHI INSTITUTE OF SCIENCE AND



### SREENIDHI

#### Department of Computer Science & Engineering COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Course Code	Course Name		Co's
		C01	Explain the fundamental aspects of atomic, molecular orbitals and metal complexes.
		C02	List general properties of polymers, lubricants and engineering materials.
9HC04	ENGINEERING	C03	Outline basic properties of water and its usage in domestic and industrial purposes.
		C04	Summarize electrochemical procedures related to corrosion.
=	-	C05	Interpret potential applications of chemistry and practical utility of various organic reactions and drug molecules.
9FC01	PROBLEM SOLVING USING C	C01	Explain the basic computer concepts and Illustrate programming principles of C language.
		C02	Develop C programs to solve simple mathematical and engineering problems using decision control, loop statements, arrays and strings.
		C03	Apply modular programming using functions to develop reusable code.
		C04	Analyze memory oriented concepts using pointers to implement inter function, function communication, pointer arithmetic.
		CO5	Describe file handling concepts using C.
9HC11	MATRIX ALGEBRA AND CALCULUS	C01	Solve the linear system of equations.
		C02	Determine the Eigen values and Eigenvectors of the matrix and apply Cayley Hamilton Theorem to obtain the higher powers of a matrix.
		C03	Identify the nature of the quadratic form and reduction of the quadratic form to its canonical form.
		C04	Apply appropriate mean value theorems to obtain the mean values and find the power series expansion of a function.
		CO5	Solve the first order and higher order ordinary differential equations with constant coefficients.
9HC01	ENGLISH	C01	Understand and demonstrate the use of diverse
	Code 9HC04 9FC01 9HC11	Code9HC04ENGINEERING CHEMISTRY9HC01PROBLEM SOLVING USING C9FC01And Calculus	Code         C01           C02         C03           PROBLEMISTRY         C03           C04         C04           C05         C05           PROBLEM SOLVING C         C02           C04         C03           C05         C04           C05         C04           C05         C01           C05         C03           C04         C05           C05         C04

		ESSENTIAL		forms of vocabulary in their communication.
		ENGLISH		Recognize different grammatical structures and
		LANGUAGE	C02	use the appropriate ones in their
		SKILLS		communication.
				Develop effective reading skills by applying
			C03	strategies to comprehend different types of
			005	texts.
		ORAL		Describe people, objects and situations using
	9HC61	COMMUNICAT	C01	simple sentences with proper pronunciation.
		IONS LAB-1		Use apt expressions and narrate stories in
			C02	simple sentences.
			C01	Estimate the hardness and chloride in water.
			CUI	
		ENGINEERING	C02	Determine strength of acid by potentiomeric
	9HC64	CHEMISTRY LAB		and conductometric methods.
			C03	Demonstrate preparation of polymer, aspirin
				and inorganic compound.
			<b>G</b> 0.4	Develop programs to solve simple
			C01	mathematical and engineering applications
	9FC61	PROBLEM SOLVING		using C language.
		USING C LAB	C02	Illustrate various operations on files to develop
			02	programs using C language.
				Demonstrate and make use of the workshop
		WORKSHOP/MANUF	C01	tools for Fitting, Carpentry, Welding, Casting,
		ACTURING		Smithy, Moulding, Glass cutting and Electric
	9BC61			connections.
		PROCESSES LAB		Design and Fabricate jobs with wood, MS
			C02	flat, GI Sheet material.
				Interpret the concept of quantum mechanics,
			C01	Schroedinger wave equation and its application
	9HC07	ENGINEERING		for one dimensional potential box.
	711007	PHYSICS		Explain the principle, construction and working
		PHISICS	C02	of lasers and fiber optics along with their
				applications.
			C03	Summarize the phenomenon of magnetism and
			005	superconductivity.
				Outline the concepts of dielectrics, polarization
			C04	and apply the same for Piezo, Ferro and Pyro-
				electricity.
			C05	Identify the nature of semiconductors and
			C05	demonstrate the semiconductor devices.
			COC	Characterize the nano and bulk materials for
I-II & A22			C06	various applications.
				Explain different data structure and select the
			C01	appropriate data structure to develop
	9EC01	DATA STRUCTURES		applications.
		DATA SIKUCIUKES	C02	Illustrate various Linear, Non Linear data
L			C02	indutate various Linear, 11011 Linear data

			structure in developing applications.
			Demonstrate various hashing and collision
		C03	resolution techniques for enhancing the
			performance of algorithms.
		C04	Asses the performance of various searching
		C04	and sorting techniques.
			Compute the Jacobian transformation, the
		C01	extreme values of a multivariable function and
9HC12	ADVANCED		solve the first order linear and nonlinear PDEs.
	CALCULUS		Evaluate double integrals using change of order
		C02	of integration and change of variables, triple
			integrals.
			Determine Fourier series expansion of a
		C03	function over the interval.
			Find directional derivative and solve the
		C04	problems on line, surface and volume integrals.
			Apply the principles of electrical circuits and
	BASIC ELECTRICAL	C01	DC generation with basic equations.
9AC48	AND ELECTRONICS ENGINEERING		Illustrate the working principles of DC and
		C02	three phase AC motors.
			Analyse the construction and working
		C03	principles of diode, various transistors with
			applications.
		C04	Use numbering systems to solve Boolean
		C04	expressions.
		C01	Outline the basics of the Engineering Graphics,
		CUI	Curves and Auto Cad.
9BC01	ENGINEERING		Interpret the concepts of orthographic and
	GRAPHICS	C02	isometric projections of lines, planes and
			solids.
		C03	Draw the sections of solids and development of
			surfaces.
		C04	Develop orthographic views from isometric
			views and vice versa.
		C01	Use appropriate language in varied real-world
	ORAL	C01	scenarios Practice effectively the speaking
9HC62	COMMUNICATION LAB – II		skills with the apt body language.
	LAB - II	C02	Develop a winning presentation and present
		C02	themselves with ease in various competitive situations.
		C01	Demonstrate the concepts of photo electric effect, total internal reflection, diffraction and
9HC66	ENGINEERING		dispersion of light.
711000	PHYSICS LAB		Demonstrate the concepts of rigidity modulus,
	LAD	C02	periodicity and oscillations.
			periodicity and operinations.

			C03	Compare and contrast the Biot-Savart law with Oersted law and explain the concept of Magnetostriction.
			C04	Analyze the electrical resonance, time constant, band gap and forward resistance of a semiconductor diode.
			C01	Develop programs to illustrate various linear and nonlinear data structures using C language.
	9EC61	DATA STRUCTURES Lab Using C	CO2	Develop programs to assess the performance of various searching and sorting techniques using C language.
			CO1	Understand and apply the principles of electrical engineering to solve basic equations.
			CO2	Apply the knowledge gained to explain the principles of single and three phase AC circuits.
	8AC41	BASIC ELECTRICAL ENGINEERING	CO3	Apply the knowledge gained to explain the principle and operation of DC machine along with its applications.
			CO4	Use the principles of single phase transformer along with its applications and solve the equations.
			CO5	Realize the principle and operation of three phase induction motor with its applications.
			CO6	Understand the operation of different measuring instruments along with its applications.
	8CC54	ANALOG ELECTRONIC CIRCUITS	CO1	Understand the Fundamentals of diode & BJT operation, Characteristics, diode application as rectifiers.
			CO2	Comprehend different biasing circuits of BJT amplifiers.
			CO3	Analyze small signal model of BJT with h- parameters.
II-I & A20			CO4	Describe the working and construction of FETs and characteristics & biasing of FET and Analyze the small signal model of FET.
			CO5	Understand the fundamentals of JFET and its operation and characteristics.
			CO6	Determine the feedback and analysis of oscillators.
		C OBJECT ORIENTED PROGRAMMING THROUGH JAVA	CO1	Comprehend the fundamentals of Java, Classes, Objects and design the java programs using constructors and String handling methods.
	8EC02		CO2	Design the programs using inheritance, polymorphism and interface.
			CO3	Develop programs using Packages, I/O Streams and collections.
			<b>CO4</b>	Apply the concepts of Exception handling and

			1	M-1/ithan the former in
				Multithreading for various scenarios.
			CO5	Create programs using AWT, Swings and develop applications using event handling.
			<b>CO6</b>	Develop applications using Applets and client
				server programs using networking concepts.
			CO1	Define the syntax and semantics of propositional
				logic.
			CO2	Translate statements from a natural language into
				its symbolic structures in logic.
				Prove elementary properties of modular arithmetic
		DISCRETE	CO3	and explain their applications in Computer Science,
		MATHEMATICS		for example, in cryptography and hashing
	8F303			algorithms.
			CO4	Apply the notion of relations on some finite
				structures, like strings and databases.
			CO5	Analyze algorithms using the concept of functions
				and function complexity.
				Apply graph theory models of data structures and
			CO6	state machines to solve problems of connectivity
				and constraint satisfaction, for example,
				scheduling.
	8DC12	COMPUTER ORGANIZATION	CO1	Perceive basic operational concept of computer and data processing.
				Use data types with instruction set of specified
			CO2	architecture.
				Justify different control unit design and algorithms
			CO3	for various operations.
			<b>CO4</b>	Elaborate basic architecture of 8086 processor.
			CO5	Write assembly language programming and debug
				to 8086.
			CO6	Interface devices to 8086 processor.
			CO1	Assess themselves using SWOT analysis.
			CO2	Appraise the importance of certain soft skills like
				time management and goal setting.
		SOFT SKILLS	CO3	Improve their verbal ability to handle the
				competitive exams.
			CO4	Enhance their team skills and design thinking
	8HC03			capabilities for effective problem solving and
				decision making.
			CO5	Know their emotional quotient which guides their thinking behavior and below them manage stress
				thinking, behavior and helps them manage stress efficiently.
				Equip themselves with the prerequisites, and
			CO6	relevant techniques to effectively attend corporate
				interviews.
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	8HC17	UNIVERSAL HUMAN VALUES	C01	This course also discusses their role in their family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course named as "H-102 Universal Human Values.
			CO2	Understanding Harmony is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.
			CO1 CO2	Evaluate programs to generate Prime numbers, Roots of quadratic equation and Fibonacci series. Implement small application such as banking
		OBJECT ORIENTED PROGRAMMING	CO3	system. Compare programs on operator, function overloading and dynamic method dispatch.
	8EC62	THROUGH JAVA LAB	CO4	Evaluate programs to implement interface and packages.
			CO5	Explain and write programs to implement threads.
			CO6	Illustrate programs to implement applets and event handling.
			CO7	Illustrate an application to implement client and server scenario.
			CO1	Understand the working of single-phase transformer under different conditions, the performance of three phase induction motor, different speed control methods of DC motor with and without loading with its performance.
		BASIC ELECTRICAL ENGINEERING AND ANALOG ELECTRONICS CIRCUITS LAB	CO2	Understand the applications of Thevenin's
	8AC91		CO3	Theorem in circuit analysis. Identify, Specify and test R, L, C Components (Colour Codes), Potentiometers, Switches, Coils, Relays.
			CO4	Identify, Specify and test Active Devices, Diodes, BJTs, Low power JFETs.
			CO5	Explain and demonstrate working of PN Junction and Zener diode.
			CO6	Explain and demonstrate working Half and Full wave Rectifier without filters.
			CO7	Demonstrate working of CE characteristics and its application as an amplifier.
			CO1	Familiarize the architecture of 8086 processor, assembling language programming and interfacing

	8DC62	COMPUTER		with various modules.
	8DC02	ORGANIZATION LAB		
			CO2	Experiment with Arithmetic operations of binary number system.
			CO3	Simulate any type of VLSI, embedded systems, industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.
	8E378	COMPREHENSIVE TEST AND VIVA- VOCE	CO1	Assessed the knowledge of the students in the Core and Elective subjects that they have studied till the completion of that academic year.
		TECHNICAL	CO1	Identify topics related to Computer Scienec and Engineering domain.
	8E386	SEMINAR - III	CO2	Collect, survey and organize content in PPT form.
			CO3	Present seminar in an effective manner.
			C01	Solve the random variable problems and probability distributions.
		PROBABILITY AND STATISTICS	CO2	Estimate the parameters and solve the problems using central limit theorem.
	8HC16		CO3	Test the hypothesis related to samples concerning to the means and proportions of large size samples.
			CO4	Apply and solve the problems using t-test, Chi- square test also testing the hypothesis problems on small size samples, goodness of fit and independence of attributes.
II-II & A20			CO5	Solve the problems on measures of central tendency, Correlation.
1120			CO6	Classify and differentiate various regression models.
		DIGITAL	CO1	Apply the rules of Boolean algebra to simplify Boolean expressions.
	8CC55		CO2	Simplify of Boolean expressions using K-map.
		ELECTRONICS	CO3	Design MSI combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters.
			CO4	Design basic memory units (latches and flip-flops) and sequential circuits such as counters and registers
			CO5	Create digital design using PLD's such as ROM's, PLA's, PAL s.
			CO6	Design the digital controllers using Algorithmic State Machine Charts.
			CO1	Analyze worst-case running times of algorithms using asymptotic analysis.
			CO2	Synthesize divide and-conquer algorithms. Derive

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				and solve recurrences describing the
				performance of divide-and-conquer algorithms.
				Describe the greedy paradigm and explain when an
		DESIGN AND	CO3	algorithmic design situation calls for it. Recite
	8FC05	ANALYSIS OF	005	algorithms that employ this paradigm. Synthesize
		ALGORITHMS		greedy algorithms, and analyze them.
			<b>GO</b> 4	Comprehend the concept of dynamic programming
			CO4	algorithms, their applications and analyze them.
				Analyze the Backtracking and Branch and Bound
			CO5	algorithms and also identify the scenarios for its
			000	applicability.
				Comprehend the concept of P and NP Problems
			CO6	and its usage in the applications.
			COL	Analyze importance and significance of models,
			C01	Database languages, architecture and design of
				Data Base Systems.
			CO2	Understand Relational Model – Integrity
				Constraints, Logic.
			~ ~ ~	Analyse data base Design and Views of databases,
			CO3	queries using Relational Algebra and Relational
				Calculus.
	8EC03	DATABASE MANAGEMENT SYSTEMS		Solve Queries with Comparison Operators,
			CO4	Aggregative Operators and nested queries. Queries
				with joins.
			CO5	Apply Schema refinement through all forms of
				Normalization to eliminate database redundancy.
				Apply ACID properties in transaction. Ensuring
			CO6	serializability in concurrent transactions.
			000	Concurrent control methods and recovery of
				transaction.
			<b>CO7</b>	Analyze External Storage Organization
				mechanisms and apply Indexing in databases for
				query optimization to enhance system performance.
				Identify software process and software engineering
			C01	practices to select and justify approaches for a
		SOFTWARE		given project and its constraints and distinguish
		ENGINEERING AND		lifecycles for developing software product.
	8F404	OOAD		Describe the importance and principles of Unified
		CO2	Modeling Language, its building blocks and to	
				relate UML paradigm for problem solving.
				Define and design models for the requirements
			CO3	stated in the software project.
				Comprehend what and how to gather the
			CO4	requirements for a project.
				Design class, object and interactive diagrams and
			CO5	know their significance of an application.
				know men significance of an application.

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			CO6	Design advanced behavioral and architectural
				modeling and work on case studies.
			CO1	Acquire the basics of Managerial Economics at Micro level, Demand analysis and production
			COI	analysis in particular.
				Expose on Cost concept, Revenues and Market
			CO2	structure and describe the concepts.
		ECONOMICS,		Understand the basic concepts of Accounting,
8Z	ZC01	ACCOUNTANCY AND MANAGEMENT	CO3	Double entry system and Bookkeeping.
		SCIENCE		Interpret the concepts of Capital expenditure,
		bennien	<b>CO4</b>	Revenue expenditure and Final accounts ad their
				significance.
				Identify knowledge and elaborate the basics of
			CO5	Management, its principles and various functions
				performed in organization.
			CO6	Recognize various personality traits, perception,
				attitudes of individuals working in organization.
8H	HC05	ENVIRONMENTAL	CO1	Understand about ecosystem and energy flow
		SCIENCE AND ECOLOGY		among the organisms.
		ECOLOGI	CO2	Know the resources available, use of them and
			CO3	overexploitation of the resources in the nature.
			CO3	Learn the value, use and value of biodiversity.
				Understand the causes and effect of pollution and implement measures in control of pollution.
				Understand the sustainable development and
			CO5 CO6	implement green technology for sustainable
				development.
				Learn and implement policy to protect the
				environment
		DATABASE MANAGEMENT SYSTEMS LAB		Understand how to create tables for a database and
			CO1	apply Queries using ANY, ALL, IN, EXISTS,
				NOTEXISTS, UNION, INTERSET, Constraints.
91	EC63			Explore Queries using Aggregate functions such as
OL	2003		CO2	[COUNT, SUM, AVG, MAX, MIN, GROUP BY,
				HAVING], Conversion functions and use string
				functions for a given application.
			CO3	Learn and demonstrate write programs using PL/SQL programs using exceptions, COMMIT,
			005	ROLLBACK and SAVEPOINT in PL/SQL block
				Gain knowledge in implementing programs using
			004	WHILE LOOPS, FOR LOOPS, nested loops using
			CO4	BUILT– IN Exceptions and Implement
				Procedures.
				Understand Programs for stored functions invoke
			CO5	functions in SQL Statement and Implement
				programs for packages specification.

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			Know the significance and Implement programs
		CO6	using features of CURSORs and its variables and
			develop Programs implementing Triggers.
		CO1	Identify software process and software engineering
		COI	practices to select and
			Justify approaches for a given project and its
		CO2	constraints and distinguish life cycles for
			developing software product.
			Understand the importance and principles of
	COMPUTER AIDED	CO3	Unified Modeling Language, its building blocks
	SOFTWARE	000	and to relate UML paradigm for problem solving.
8F463	ENGINEERING		
	(CASE) TOOLS LAB	CO4	Define and design models for the requirements
			stated in the software project.
		CO5	Design class, object and interactive diagrams and
			know their significance.
		CO6	Design advanced behavioral and architectural
		000	modeling and work on case
			Implement Merge sort algorithm for sorting a list
		CO1	of integers in ascending order, Dijkstra's algorithm
			for the single source shortest path problem.
		COA	Implement Prim's algorithm to generate minimum
	DESIGN AND	CO2	cost spanning tree.
	ANALYSIS OF		Solve the job sequencing with deadlines problem
8FC64	ALGORITHMS LAB	CO3	using greedy algorithm.
			Design the solution for the 0/1 knapsack problem
		CO4	using implement Dynamic Programming and
		04	implement.
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		CO5	Using Dynamic programming approach solve the
			Optimal Binary search Tree problem.
		CO6	Design and implement n-queens problem using
			backtracking approach.
8E479	COMPREHENSIVE	CO1	Asses the knowledge of the students in the Core
	TEST AND VIVA		and Elective subjects that they have studied till the
	VOCE - IV		completion of that academic year.
		C01	Identify topics related to Computer Scienec and
			Engineering domain or disruptive technologies.
8E487	TECHNICAL	CO2	Collect, survey and organize content in PPT form.
01/10/	SEMINAR – IV	CO3	Present seminar in an effective manner.
8E491	SUMMER BREAK		
	INTERNSHIP – I		
		C01	The students will acquire basic knowledge on
			Skills of Entrepreneurship.
			The students will understand the techniques of
		CO2	selecting the customers through the process of
			customer segmentation and Targeting.
		CO3	Business Models and their validity are understood
1			Dusiness models and men valuery are understood

	8ZC22	BASICS OF		by the students.
	02022	ENTREPRENEURSHIP	<b>CO</b> 4	The basic cost structure, Revenue Streams and the
III-I &			CO4	pricing strategies are understood by the students.
A20			CO5	The students will acquire knowledge about the project management and its techniques.
			CO6	The students get exposure on marketing strategies and business regulations for the Start up.
			CO1	Gain knowledge relating to Economics, variou sectors and its growth.
			CO2	Will gain knowledge relating to various concept of National income and related aggregates.
	8ZC25	BASICS OF INDIAN ECONOMY	CO3	Students will learn about Indian Industrial policy and benefits of LPG to India.
			CO4	Comprehend knowledge relating to Fiscal policy & Taxation system in India.
			CO5	Learn about inflation & business cycles.
			CO6	Know about the BoP and its influence on economy
	-		CO1	Describe the new dimensions and products served
		BANKING OPERATIONS,	CO2	by the banking system in INDIA. Explain the credit control system and creat awareness on NPA's.
	8ZC05	INSURANCE AND RISK MANAGEMENT	CO3	Apply the knowledge of Insurance concepts in realifier scenarios.
			CO4	Recognize the importance of regulatory and lega frame work of IRDA.
			CO5	Identify the risk management process and methods
			<b>CO6</b>	Calculate the diversity of risk and return.
		INTRODUCTION TO	CO1	Understand the Additive manufacturing processe and their relationship with subtractiv manufacturing.
			CO2	Demonstrate comprehensive knowledge of the broad range of liquid based rapid prototyp processes, devices, capabilities and materials the are available.
	8BC51	ADDITIVE MANUFACTURING PROCESS	CO3	Apply the principles of casting in Additiv manufacturing processes.
			CO4	Articulate the various tradeoffs of Additiv manufacturing software's/data format that must b made in selecting advanced/additive manufacturin processes, devices and materials to suit particula product requirements.
			CO5	Learn various applications of additive manufacturing, such as in architecture art, healt care direct part production and mass customization
		CONTROL SYSTEM	CO1	Understand basic concepts of control systems.
		ENGINEERING	CO2	Study about time response analysis.

	8AC46		CO3	Understand basic concepts of stability and root
				locus method.
			004	Study about frequency response analysis.
			CO4	
			CO5	Learn basic concepts stability analysis in frequency domain.
			CO6	Outline fundamentals of state space analysis.
			CO1	Classify embedded systems and their applications.
			CO2	Write ALP for 8051 architecture.
			CO3	Implement interfaces for Embedded System using various protocols and hardware modules.
			CO4	Understand the principles of Communication
	8DC42	EMBEDDED		Interface, Wireless and Mobile Systems Protocols
		SYSTEMS	CO5	Design the interrupt routines for variois OS concepts and Memory Management techniques in an RTOS Environment.
			CO6	Recognize the issues and design of basic Real- Time Operating System principles, Semaphores and Queues, Hard Real-Time Scheduling Considerations.
			CO1	Gain the knowledge on the inputs required for design thinking and also gain familiarity on concepts related to design thinking.
			CO2	Understand the techniques of idea generation.
	8ZC08	DESIGN LITERACY	CO3	Classify different phases of design thinking.
		AND DESIGN THINKING	CO4	Realize the product design process.
			CO5	Understand design thinking for service design.
			CO6	Gain knowledge on various cases related to design thinking.
		1 SEMANTIC WEB & SOCIAL NETWORKS	C01	Appraise the role of the Web, its need and Intelligence.
	8EC11		CO2	Outline the concepts of Machine Intelligence Ontology, Inference engines, Software Agents, Berners-Lee www and Semantic Road Map.
			CO3	Conceptualize Knowledge Representation for the Semantic Web with Resource Description Framework (RDF) / RDF Schema, Ontology Web Language (OWL), UML and XML Schema.
			CO4	Apply Ontology Engineering using Ontology Development Tools/ Methods, Ontology Libraries, Ontology Mapping, Logic and Inference Engines.
			CO5	Illustrate Semantic Web Applications, Services and Technology.
			CO6	Apply Social Network Analysis, Semantic web networks analysis and describe Building of

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				Semantic Web Applications with social network
				features.
				Explain Architecture Business Cycle, Architectural
			CO1	patterns, reference models, reference architectures,
				and architecture structures.
				Describe architecture, Quality Attributes, styles,
			CO2	patterns and design of Architecture along with the
				Documentation of architecture.
		SOFTWARE		Discuss Software Architecture evaluation,
		ARCHITECTURE AND		Architecture design decision making, SAAM,
	8FC12	DESIGN PATTERNS	CO3	•
				ATAM and CBAM. And plan software architecture
				in future.
			CO4	Plan and use Creational patterns and Structural
				patterns application development.
				Solving problems using Induction learning,
			CO5	Decision Tree, Statistical learning methods,
			000	learning with hidden variables, EM algorithm,
				Instance based learning and Neural Networks.
				Explain Behavioral patterns using Command,
			CO6	Interpreter, Iterator, Mediator, Memento, Observer,
				State, Strategy, Template method and Visitor.
				Understand basic terms related to Big Data, Data
			~ ~ 1	Science and Analysis of Data. Learn Statistical
			CO1	Inference, Probability Distributions and Fitting a
				model.
				Implement Data analysis techniques for solving
			CO2	practical problems.
	8EC16	INTRODUCTION TO	CO3	Perform Data analysis on variety of data using R.
		DATA SCIENCE	0.05	
				Exercise appropriate manipulation techniques on
			CO4	lists and vectors using operators in R. Comprehend
				the significance and use the iterative programming
				and functions in R.
			CO5	Learn and describe the various Dimensionality
				Reduction techniques available.
			CO6	Apply the suitable visualization techniques to
				output analytical results.
				Understand fundamental terms in Computer
			CO1	Graphics, various visible surface determination
				algorithms and midpoint and line segment analysis.
				Explore 2D graphics and algorithms including: line
			CO2	drawing, polygon filling, clipping, and
				transformations.
			Apply functions 2D viewing and apply clipping	
	00045		CO3	algorithms.
	8FC17	COMPUTER		Understand the concepts and techniques used in 3D
		GRAPHICS	CO4	computer graphics, including viewing
				computer graphics, metuding viewing

			transformations, hierarchical modeling, color,
			lighting and texture mapping.
		<b>GO-</b>	Apply single and multiple 3-D viewing techniques
		CO5	like viewing coordinates etc and also back-face
			detection, depth-buffer, and scan-line methods.
		CO6	Analyze the animation production pipeline and Produce a short animation.
			Understand the fundamental concepts of Security
		CO1	Attacks and security standards with the model for
			network Security.
		CO2	Review and analyze conventional cryptographic
		02	techniques and authentication.
OFCOC	INFORMATION		Review and analyze public cryptographic
8FC06	INFORMATION SECURITY	CO3	techniques and outline the concepts of Kerberos
	SECORIT		and email privacy.
		CO4	Recognize architecture, key management and
		04	header formats of IPSEC.
		CO5	Outline the various web security threats and
		0.05	protocols.
		CO6	Understand Intrusion Detection System and Design
		000	principles of Firewalls.
		CO1	Understand the fundamentals of Data Mining and
	DATA	COI	Identify the techniques used in data preprocessing.
8EC04	WAREHOUSING AND	CO2	Understand the fundamentals of Data Warehousing
	DATA MINING		and issues of mining with respect to architectures,
			technologies such as OLAP.
		CO3	Learn insights of Data Mining Primitives and Infer
			the significance of Concept Description.
	CO4	Apply the algorithms for mining association rules	
			in large databases.
		CO5	Discuss and apply the models of classification and use those models for the prediction of the new
		005	1
			samples. Apply various clustering techniques available for
		CO6	numerous applications. Identify the optimal
			clustering technique for a particular application.
		act	Understand concepts of different networks,
		CO1	network models and transmission medias.
			Classify various data conversion techniques and
		CO2	Multiplexing, Demultiplexing techniques.
	DATA	CO2	Summarize the design issues of Datalink layer and
		CO3	solve problems on Error and Flow control.
	DATA COMMUNICATIONS		Infer MAC layer protocols, various connecting
8EC05	AND NETWORKS	CO4	devices, IP addressing concepts and design a
			network (using subnetting and supernetting
			techniques).

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			005	Analyze various routing algorithms and outline the
			CO5	concepts of Internet control protocols and
				congestion control techniques.
			GOL	Recognize services and protocols of transport
			CO6	layer, application layer along with network security
				issues.
			CO1	Work with the ETL and Mining tools.
			CO2	Demonstrate the classification, clustering
		DATA	002	techniques on the data sets.
	OFC	WAREHOUSING AND		Comprehend the results obtained in the clustering,
	8EC64	DATA MINING LAB	CO3	Association and Classification techniques applied
				on the data sets with varied input parameters.
			CO4	Ability to apply mining techniques for realistic
			004	data.
	8EC65	COMPUTER	CO1	Implement and analyze framing methods of the
		NETWORKS LAB	COI	data link layer.
			CO2	Implement and analyze framing methods of the
			02	data link layer.
			CO2	Illustrate and implement error detection &
			CO3	correction techniques.
			CO4	Implement different Routing Algorithms.
			CO5	Understand basic Network Commands.
			CO6	Use of Wireshark and NS-2 tools.
				Understanding of Symmetric Encryption
			CO1	Algorithms, Asymmetric Encryption Algorithms,
	8FC65	INFORMATION SECURITY LAB	001	Hash and Key Exchange, Digital Signature and
				Digital Envelope, Demonstration of NS3 Tool.
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			CO1	Demonstrate a breadth of knowledge in Intellectual
				property.
			CO2	Overview of Patents, Searching, filling and drafting
	8EC49	INTELLECTUAL		of Patents.
	OLC4)	PROPERTY RIGHTS	CO3	Overview of copyright & GI.
			CO4	Overview of Trade Mark & Trade Secret,
			CO5	Overview of Integrated Circuit and Industrial
				Design.
				Knowledge about different national and
			CO6	international: Conventions and Treaties Governing
				the IPRs.
			001	Use the concepts learned in the courses, so far, in
			C01	conceptualizing, designing and executing the
				modules of the projects.
				Exhibit the interest in learning the modern tools
			CO2	and technologies through the bridge courses
				arranged in the college, beyond the curriculum, and

	8E491	SUMMER INDUSTRY		hence developing the software.
	012471	INTERNSHIP-I		Inculcate an enthusiasm to use the creative ideas to
				build the innovative projects and prototypes which
			CO3	are meeting the current needs of the market and
				•
				society as a whole.
			CO4	Improve their communicative skills and team
				skills.
				Gain knowledge on the stages of Startup and the
			CO1	turbulence environment it undergoes and the stages
				related to growth of the Startup.
		ADVANCED		Exposed to the various business models and
	8ZC23	ENTREPRENEURSHIP	CO2	critically evaluating the effectiveness of the
III-II &				business models and products.
			coa	Understand the method of business traction, create
A20			CO3	roles and build their A- team.
			<u> </u>	Understand the various channels of revenue
			CO4	building and exploration of new revenue avenues.
			~~-	Understand the need of sales planning and people
			CO5	plan and also financial modeling.
				Exposed to the legal implications affecting the
			CO6	company's prospects and identifying right mentors
			000	and advisors to support startups.
				Outline knowledge relating to the Indian
			CO1	Constitution and the Preamble to the Constitution.
				Relate to the fundamental rights and duties of the
			CO2	Indian citizens and the directive principles of state
			02	1 1
				policy.
	8ZC26	BASICS OF POLITY	CO3	Identify about the federal structure and judiciary of India.
		AND ECOLOGY		
			CO4	Understand knowledge relating to the conservation
				of the environment.
			CO5	Analyse about bio-diversity and climatic changes
				occurring in the environment.
			COC	Discuss about the international treaties,
			CO6	conventions and organizations active in the field of
				environmental protection.
			CO1	Students will understand the nature of
				Entrepreneurship and its importance.
			CO2	Will gain knowledge regarding project, its life
	8ZC19	ENTREPRENEURSHIP	_	cycle and organization.
	02019	PROJECT	CO3	Will gain knowledge relating to project formulation
	MANAGEMENTAND		and implementation.	
		STRUCTURED	CO4	Comprehend the components of structured finance.
	FINANCE	CO5	Establish a framework of CMBS.	
			CO4	Students will gain knowledge relating to the CRE
	1		CO6	Servicing.

	PRINCIPLES OF OPERATIONS	CO1	Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.
8BC52	RESEARCH	CO2	Recognize and Solve the problem of transportation involving a large number of shipping routes with least transportation cost and generate optimal assignment strategy for different situations.
		CO3	Use Johnson's rule to create the optimal sequencing schedule for a sequencing problem and make decisions about replacing an item using replacement policy.
		CO4	Analyze the performance measures of Queing system and Calculate the EOQ for minimizing the total inventory cost.
		CO5	Apply simulation techniques for solving various types of problems and general idea development about Markov chains.
		CO1	Understand the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. The student demonstrates the ability to compensate for the errors in the instruments and to extend the range of the instruments.
8AC44	FUNDAMENTALS OF MEASUREMENTS AND 8AC44 INSTRUMENTATION	CO2	Demonstrates the knowledge of Potential and Current transformers; the errors in them and the effect of having an open/short in the secondary circuits; Understand the principle of operation of Dynamometer and Moving-iron type of Power factor meters.
		CO3	Understand the principle of operation of dynamometer type of Wattmeter and Induction type of Energy meter; use the wattmeter to measure the Active and Reactive power and demonstrates the ability to extend the range of them.
		CO4	Identify and use different techniques of measurement of Resistance, Inductance and Capacitance values.
		CO5	Understand the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers and Cathode ray Oscilloscope.
		CO6	Demonstrates the ability in characterizing the different types of transducers and uses them to measure Strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque and Temperature.

				Identify the working principle of diffusion, ion
		INTRODUCTION TO VLSI DESIGN	CO1	implantation, metallization and other basic
	8DC43			components.
		VLSI DESIGN	CO2	Comprehend basic electrical properties of various
			02	types of mos transistors.
			CO3	Identify the significance of cmos logic gates and
			0.05	design the multiplexers.
			CO4	Draw layouts for a cmos circuit and logic design
				and validate them.
			CO5	Differentiate the various types of memories and clocking strategies.
			COL	Design various combinational and sequential
			CO6	circuits.
				Understand the inputs required for human centric
			CO1	design thinking the students learn the techniques of
			~ ~ •	idea generation.
			CO2	Explore the different phases of Ideation process.
		CO – CREATION AND	CO3	Outline emerging technologies and understand 3d
	8ZC09	PRODUCT DESIGN	CO4	printing in manufacturing.
				Indicate developments of prototypes. Understand reverse engineering methods in product
			CO5	development.
				Review the information on IPR, and patent
			CO6	application.
			CO1	Appraise networking and Internet concepts and be
			CO1	familiar with OSI Model and TCP/IP model.
			CO2	Detect networking errors learn correction
			002	techniques.
			<b>GO</b>	Infer the role of protocols in networking and to
	8EC12	ADVANCED	CO3	analyze the services and features of the various
		COMPUTER		layers in the protocol stack.
		NETWORKS	CO4	Differentiate Internet addressing IPv4 and IPv6 and Internet protocols.
				Conceptualize wireless networking and to Develop
			CO5	new protocols in networking.
			CO6	Design new virtual private networks.
			CO1	Outline Forensic science and Digital Forensic
			CO1	concepts.
			CO2	Comprehend the technical concepts involved in
				understanding the digital forensics.
		CC22 DIGITAL	CO3	Interpret the cyber pieces of evidence, Digital
	8EC22			forensic process model.
		FORENSICS	CO4	Familiarize the computer operating system
			COF	concepts involved in digital forensics.
			CO5	Determine the legal aspects of Digital Forensics.
			CO6	Demonstrate various forensic tools to investigate

				the other oning and to identify the distance of
				the cyber crime and to identify the digital pieces of evidence.
				Explain primitives of Project Planning and
			CO1	evolution of software economics.
				Describe software economics; reduce Software
			COA	product size, improvement in software
			CO2	processes, improving team effectiveness,
				improving automation, Achieving quality.
			CO3	Explain Life cycle phases and Artifacts of the
	8FC13	SOFTWARE	005	process.
	01 010	PROJECT	CO4	Describe Model based software architectures and
		MANAGEMENT		Work Flows.
				Apply Checkpoints for a process such as Major
			CO5	mile stones, Minor Milestones and apply work
			005	breakdown structures for a iterative process within cost and schedule. Describe Project Organizations
				and Responsibilities.
				Describe Automation and Project Control and
				Process instrumentation and explain Future
			CO6	Software Project Management such as Modern
				Project Profiles and Next generation project
				management.
			CO1	Understand the fundamental concepts of ML and
				Designing a Learning System.
			CO2	Understand the basic concepts of MLP, RBF and SVM and their applications.
				Understand the Probability models namely
			GOA	supervised, unsupervised, basic statistics analyze
	8EC17	MACHINE LEARNING	CO3	their analysis of algorithms along with their
				applications.
				Understand various Dimensionality Reduction
			<b>CO4</b>	Techniques and Apply various Evolutionary
				Algorithms with models.
			CO5	Understand the Graphical models and their
				applications. Understanding Analytical Learning and Analyze
			CO6	KBANN Algorithm.
			CO1	Analyze general terminology of image processing.
				Examine various types of images, intensity
			CO2	transformations and spatial filtering.
	OFC10	IMACE DDOCESSING	CO3	Develop Fourier transform for image processing in
	8FC18	IMAGE PROCESSING	0.05	frequency domain.
			<b>CO4</b>	Evaluate the methodologies for image
				segmentation, restoration etc.
			CO5	Implement image process and analysis algorithms.
			CO6	Apply image processing algorithms in practical

				applications.
				Introducing .Net Architecture and learn basic
		CO1	programming in C# and the object oriented	
		001	programming concepts.	
				Explain advance features and enhance skills in
			CO2	writing windows applications, ADO.NET and
			02	ASP.NET.
	8FC26	C# AND .NET		Discuss various class libraries for different
		FRAMEWORK	CO3	applications and data manipulation functions.
				Understand the advanced concepts in data
			CO4	connectivity, WPF, WCF and WWF with C#
			001	and .NET 4.5.
				Develop distributed applications using .NET
			CO5	Framework.
				Create mobile applications using .NET compact
			CO6	Framework.
			CO1	Design the finite automata different Languages.
			001	Construct finite Automata for a given regular
				expressions, and derive strings with suitable
			CO2	examples. Conceptualize context free grammars
				and normal forms.
				Design the push down automata and Turing
	8FC07	AUTOMATA THEORY AND COMPILER DESIGN	CO3	Machine for complex languages.
			<b>GO</b> 4	Understand LEX tool and relate parsing
			CO4	techniques.
				Demonstrate and solve problems on SLR, CLR,
			CO5	LALR, operator precedence parser, LR (O), LR(1),
				LR(K) grammar and use YACC tool.
				Understand Semantic Analysis concepts to design
			CO6	compiler: and describe Intermediate code
				generation such as 3-address code form.
			C01	Understand the functional architecture of an
				Operating System with usage of system calls.
				Analyze various process scheduling algorithms &
	<b>PECO</b>	OPERATING	CO2	pragmatics of scheduling algorithms used by
	8EC06	SYSTEMS		various Operating Systems.
		<b>BIBILIND</b>	CO3	Solve issues related to process synchronization and
				Deadlocks in the Operating System.
			CO4	Illustrate the concepts of Memory Management.
			CO5	Outline the directory structure & analyze disk
				scheduling algorithms.
			CO6	Summarize the aspects of Protection and Security,
				and understand the concepts of I/O systems.
			CO1	Demonstrate the use of HTML tags. Apply Styles
			CO2	using CSS and Bootstrap.
			CO2	Develop dynamic programs using Javascript and

BEC07       WEB TECHNOLOGIES       CO3 Develop scripts using XML and validate using parsers.         CO4       Design a data-interchange format using JSON. Cos Appraise the Expressions, Fillers, Directives, Controller, and Modules of Angular.         CO5       Scope, Dependency Injections with Forms, Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.         C07       Comprehend the uses of Web servers and design the server-side scripts using Services. Co8         C08       Design responsive web applications with Forms, Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.         C09       Comprehend the uses of Web servers and design the server-side scripts using Servites. Co8         C09       Design and develop server-side scripts and components using PHP.         C01       Familiarize the cryptographic procedures and Understand its primitives.         C03       Dustify the role of electronic signatures in E- Commerce and summarize the various laws relating to it.         C04       Categorize international cyber laws and cyber crimes.         C05       Explore Penalties, Compensation and Adjuction of violations of provisions of IT Act 2000.         C06       Implementation of DPA for a given Languages/ Regular Expression.         8FC66       OPERATING SYSTEMS LAB       C01         8FC66       OPERATING SYSTEMS LAB       C01					
SEC07       WEB TECHNOLOGIES       CO3       parsers.       Co4       Design a data-interchange format using JSON.         C04       Design responsive web applications with Forms. Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.       Design responsive web applications with Forms. Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.         C07       Comprehend the uses of Web servers and design the server-side scripts using Servlets.       Co8         C08       Design and develop server-side scripts and components using PHP.       Co1         SBFC08       CYBER SECURITY AND CYBER LAWS       Co1       Familiarize the cryptographic procedures and Co2         SFC08       AND CYBER LAWS       Co3       Outline Security policy in Legislation and Co2       Commerce and summarize the various laws relating to it.         SFC08       COMPILER DESIGN LAB       Co4       Categorize international cyber laws and cyber crimes.         SFC66       COMPILER DESIGN LAB       Co1       Implementation of DFA for a given Languages/ Regular Expression.         SEC66       OPERATING SYSTEMS LAB       C01       Implement scheduling algorithms, Deadlocks, File allocation and Memory management techniques.         SFC19       COMPUTER VISION       Co3       Co4       Explore the various camera models, multi view geometry, structures and generate 3D model from images. <th></th> <th></th> <th></th> <th></th> <th>Typescript.</th>					Typescript.
SEC07       WEB TECHNOLOGIES       CO4       Design a data-interchange format using JSON. Appraise the Expressions, Filters, Directives, Controller, and Modules of Angular.         C06       Design responsive web applications with Forms, Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.         C07       Comprehend the uses of Web servers and design the server-side scripts using Services.         C08       Design and develop server-side scripts and components using PHP.         R       C01       Familiarize the cryptographic procedures and Understand its primitives.         001       Familiarize the cryptographic procedures and Understand its primitives.         8FC08       CYBER SECURITY AND CYBER LAWS         8FC08       CYBER SECURITY AND CYBER LAWS         8FC06       COMPILER DESIGN LAB         8FC66       COMPILER DESIGN LAB         8FC66       OPERATING SYSTEMS LAB         8FC19       COMPUTER VISION         8FC19       COMPUTER VISION				CO3	
8EC07       WEB TECHNOLOGIES       COS       Appraise the Expressions, Filters, Directives, Controller, and Modules of Angular.         C06       Design responsive web applications with Forms, Scope, Dependency Injection (SPA) of Angular.         C07       Comprehend the uses of Web servers and design the server-side scripts using Servlets.         C08       Design and develop server-side scripts and components using PHP.         SEC08       CYBER SECURITY AND CYBER LAWS         SEC08       CYBER SECURITY AND CYBER LAWS         SEC08       CYBER SECURITY AND CYBER LAWS         C01       Familiarize the cryptographic procedures and Understand its primitives.         C02       Comprehend E-Commerce, frame work, models and its associated threats.         Justify the role of electronic signatures in E- Commerce and summarize the various laws relating to it.         C04       Categorize international cyber laws and cyber crimes.         C05       Explore Penaltics, Compensation and Adjunction of violations of provisions of IT Act 2000.         C04       Categorize international cyber laws and cyber crimes.         C05       Explore Penaltics, Compensation and Adjunction of violations of provisions of IT Act 2000.         C04       Implementation of DFA for a given Languages/ Regular Expression.         8EC66       OPERATING SYSTEMS LAB       C01         8EC66       OPERATING SYSTEMS LAB       C01					
8EC07       WEB TECHNOLOGIES       Controller, and Modules of Angular.         006       Controller, and Modules of Angular.         007       Design responsive web applications with Forms, Single Page Application (SPA) of Angular.         007       Comprehend the uses of Web servers and design the server-side scripts using SerVets.         008       Design and develop server-side scripts and components using PHP.         001       Familiarize the cryptographic procedures and Understand its primitives.         001       Commerce and summarize the various laws relating to it.         004       Commerce and summarize the various laws relating to it.         004       Comprehend E-Commerce frame work, models and its associated threats.         1Justify the role of electronic signatures in E- Commerce and summarize the various laws relating to it.         004       Commerce and summarize the various laws relating to it.         004       Commerce and Adjunction of violations of provisions of TA ct 2000.         006       Explore Penalties, Compensation and Adjunction of violations of DTA to 2000.         007       Complet design and implement lexical analyzer in complet design and implement lexical analyzer in complet design and implementation of Top-Down Parser.         8EC66       OPERATING SYSTEMS LAB       CO1         8EC66       OPERATING SYSTEMS LAB       CO1         8FC19       COMPUTER VISION				CO4	
8EC07       WEB TECHNOLOGIES       Controller, and Modules of Angular.         C06       Design responsive web applications with Forms. Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.         C07       Comprehend the uses of Web servers and design the server-side scripts using Servlets.         C08       Design and develop server-side scripts and components using PHP.         C01       Familiarize the cryptographic procedures and Understand its primitives.         Outline Security policy in Legislation and Comprehend E-Commerce. frame work, models and its associated threats.         Justify the role of electronic signatures in E- Commerce and summarize the various laws relating to it.         C04       Explore Penalties, Compensation and Adjunction of violations of provisions of TA ct 2000.         C05       Explore Penalties, Compensation and Adjunction of violations of DTA to 2000.         C06       COMPILER DESIGN LAB       C01         SEC66       OPERATING SYSTEMS LAB       C01         8EC66       OPERATING SYSTEMS LAB       C01         8EC66       OPERATING SYSTEMS LAB       C01         8FC19       COMPUTER VISION       C03				CO5	
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CO7       Comprehend the uses of Web servers and design the server-side scripts using Servlets.         CO8         CYBER SECURITY AND CYBER LAWS         CUBER SECURITY AND CYBER LAWS         CO8         CYBER SECURITY AND CYBER LAWS         CO8         CYBER SECURITY AND CYBER LAWS         CO8         CYBER SECURITY AND CYBER LAWS         CO3         CO4         Familiarize the cryptographic procedures and Understand its associated threats.         Jusify the role of electronic signatures in E-Commerce and summarize the various laws relating to it.         CO4         Categorize international cyber laws and cyber crimes.         CO4         Categorize international cyber laws and cyber crimes. <t< td=""><th></th><th></th><th></th><td>CO6</td><td></td></t<>				CO6	
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8FC08       CYBER SECURITY AND CYBER LAWS       COI Understand its primitives.       Coulline Security policy in Legislation and Comprehend E-Commerce. frame work, models and its associated threats.         8FC08       CYBER SECURITY AND CYBER LAWS       Lustify the role of electronic signatures in E- Commerce and summarize the various laws relating to it.         C04       Categorize international cyber laws and cyber crimes.       Cool Cool         C05       Explore Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000.         C06       Classify and Outline the offences under the Cyberspace law and the Internet in India.         8FC66       COMPILER DESIGN LAB       COI         8FC66       OPERATING SYSTEMS LAB       COI         8EC66       OPERATING SYSTEMS LAB       COI         8EC66       OPERATING SYSTEMS LAB       COI         8FC19       COMPUTER VISION       CO3				-	
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8FC08       CYBER SECURITY AND CYBER LAWS       CO2       Comprehend E-Commerce. frame work, models and its associated threats.         8FC08       AND CYBER LAWS       CO3       Justify the role of electronic signatures in E- Commerce and summarize the various laws relating to it.         CO4       Categorize international cyber laws and cyber crimes.       CO4         C05       Explore Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000.         C06       Classify and Outline the offences under the Cyberspace law and the Internet in India.         8FC66       COMPILER DESIGN LAB       CO1         8FC66       COMPILER DESIGN LAB       CO1         8EC66       OPERATING SYSTEMS LAB       CO1         8EC66       OPERATING SYSTEMS LAB       CO1         8EC66       OPERATING SYSTEMS LAB       CO1         8FC19       COMPUTER VISION       CO3					1
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SEC66OPERATING SYSTEMS LABCO1Usage of up parser.YACC tools for implementing bottom up parser.8EC66OPERATING SYSTEMS LABCO1Implement scheduling algorithms, Deadlocks, File allocation and Memory management techniques.Understand the basic fundamentals of computer vision and diversity of computer vision applications.Understand the basic fundamentals of computer vision and diversity of computer vision applications.8FC19COMPUTER VISIONCO3Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques.				001	
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SYSTEMS LAB       allocation and Memory management techniques.         Understand the basic fundamentals of computer vision and diversity of computer vision applications.       Understand the basic fundamentals of computer vision applications.         8FC19       COMPUTER VISION       CO3       Explore the various camera models, multi view geometry, structures and generate 3D model from images.         8FC19       COMPUTER VISION       CO3       CO3       Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques.		8EC66	OPERATING	CO1	* *
8FC19COMPUTER VISIONCO3Understand the basic fundamentals of computer vision and diversity of computer vision applications.8FC19COMPUTER VISIONCO3Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques.				_	
8FC19       COMPUTER VISION       CO1       vision and diversity of computer vision applications.         8FC19       COMPUTER VISION       CO3       Explore the various camera models, multi view geometry, structures and generate 3D model from images.					
8FC19       COMPUTER VISION       CO3       Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques.				CO1	-
8FC19       COMPUTER VISION       CO3       Explore the various camera models, multi view geometry, structures and generate 3D model from images.         8FC19       COMPUTER VISION       CO3       Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques.					<b>5</b> 1
8FC19       COMPUTER VISION       CO2       geometry, structures and generate 3D model from images.         Analyze       and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques.					**
8FC19       COMPUTER VISION       CO3       images.         Analyze       and       apply       image         representation       continuous       and discrete representation       methods         representation       representation       representation       representation				CO2	1
8FC19COMPUTER VISIONCO3Analyze and apply image preprocessing, continuous and discrete representation methods and feature extraction techniques.					<b>o</b>
<b>8FC19 COMPUTER VISION CO3</b> continuous and discrete representation methods and feature extraction techniques.					
feature extraction techniques.		8FC10	COMPLITER VISION	CO3	
CO4 Apply regularization theory optical		01019			
				CO4	Apply regularization theory, optical

				communication stars vision and with
				communication, stereo vision, and motion
				estimation techniques to detect moving objects in a
				video.
			005	Illustrate different image shape representations and
			CO5	understand Fourier and wavelet descriptors and
				segmentation methods.
			CO6	Understand various object recognition methods,
				Hough transforms and illustrate shape matching.
				Demonstrate the use of HTML tags and be able to
			CO1	design web pages.Develop dynamic programs
			001	involving Java scripts, popup windows in
				JavaScript along Event Handling.
				Develop scripts using XML and XSLT and read
			CO2	XML documents using parsers, DOM parser, and
			02	SAX parser. Develop JSON files and access them
	OFCC	WED		via HTML pages.
	8EC67	WEB TECHNOLOGIES LAB	CO2	Implement Angular with Expressions, Filters,
			CO3	Directives, Controller, and Modules.
			CO4	Develop a Single Page Application with
			CO4	implementation of Scope and Form.
			~~~	Implement Java servlets using Apache Tomcat
			CO5	Server for User authentications.
				Develop an application in PHP with Database
			CO6	connectivity
				Use the concepts learned in the courses, so far, in
			CO1	conceptualizing, designing and executing the
			001	modules of the projects.
				Exhibit the interest in learning the modern tools
				and technologies through the bridge courses
			CO2	arranged in the college, beyond the curriculum, and
				hence developing the software.
				Inculcate an enthusiasm to use the creative ideas to
	8E694	GROUP PROJECT	CO3	build the innovative projects which are meeting the
				1 5 0
				current needs of the market and society as a whole.
			CO4	Improve their communicative skills and team skills
			COF	largely improve.
	07.55		CO5	Work as an individual and in a team.
	8E681	COMPREHENSIVE	CO1	Assessed the knowledge of the students in the Core
		VIVA VOCE		and Elective subjects that they have studied till the
				completion of that academic year.
	8E692	SUMMER		
		INDUSTRY		
		INTERNSHIP-II		
	7EC13	DATABASE	C01	Comprehend the various access control rules
		SECURITY		available to assign privileges and protect data in
L	1	1		

				databases.
			<u>C02</u>	Describe and compare the popular Security
			C02	Models.
			<u> </u>	
			C03	Categorize the security mechanisms and their
				functions.
			CO4	Identify the Security Software Design principles to
				protect data in databases.
			CO5	Classify and compare the Statistical Database
				Protection & Intrusion Detection Systems.
			<b>CO6</b>	Learn the new models of database systems and the
				models of protection.
			C01	Explain need, practices and Risk issues in Software
				requirements.
		SOFTWARE	C02	Describe Software Requirements Engineering
		REQUIREMENTS AND ESTIMATION		elements such as review, quality and priorities.
		AND ESTIMATION	C03	Explain software Modeling and Requirements
IV-I & A18	7FC11			Management.
			CO4	Apply Estimation methods for size using Mark II
			04	FPA, Full Function Points, LOC Estimation.
			CO5	Apply Cost and Schedule estimation factors during
			05	software development.
			COC	Apply tools for Requirements Management and
-			CO6	Estimation.
			C01	Discuss the importance of big data.
	7EC19	BIG DATA ANALYTICS		Interpret the challenges with big data; elaborate the
			C02	knowledge about the technological developments
				in big data environment.
			C03	Assess about NOSQL data environment.
	7EC18		004	Capability of understanding the usage of big data
			CO4	in context to cloud and other technologies.
			CO5	Justify about map reduce work flows.
				Implement Data Analysis with HADOOP and
			CO6	related tools.
		BLOCK CHAIN		Understand basic principles of HDFS and digital
		TECHNOLOGIES	C01	signature.
			~~~	Learn about blockchain advantages, Simplified
			C02	Payment Verification protocol and its life cycle.
				Explain the Nakamoto consensus and List and
	7FC16		C03	describe differences between proof-of-work and
	/1 010			proof-of-stake consensus.
			CO4	Understand Bitcoin and Ethereum.
				Learn about the legal issues of Blockchain through
			CO5	some applications.
			CO6	Discuss new trends in Blockchain technologies.
			C00	
	7EC14			Understand the Security Issues and Measures.
			C02	Know the KEY Elements and Logical Elements of

	INFORMATION		Networks.
	SECURITY.		Understand the Data Leakage, its Threats and
	MANAGEMENT AND	C03	Mitigation.
	STANDARDS	CO4	Understand the Database Security.
			Understand the Policies, Guideline and Framework
		CO5	of Information Security.
		CO6	Understand the Ethics, Roles and Responsibilities
			of ISM.
		C01	To understand the essence of agile development
			methods.
		C02	To apply the principles and practices of extreme
7FC12	AGILE SOFTWARE		programming in real world problems.
	DEVELOPMENT	C03	To incorporate proper coding standards and
			guidelines in an agile process.
		CO4	To optimize an agile process by exploring the
		CO5	possible risks and threats in the software process.
			To improve the process by eliminating waste. To design an agile process for a business
		CO6	application and deal with appropriate tradeoff.
			Elaborate the fundamentals of business
		C01	intelligence.
		C02	Link data mining with business intelligence.
	BUSINESS INTELLIGENCE	C03	Apply various modeling techniques.
7EC19		CO4	Perform the data analysis and knowledge delivery
		004	stages.
		CO5	Apply business intelligence methods to various
			situations.
		CO6	Decide on appropriate technique for the given
	AUGMENTED AND	C01	model.
	VIRTUAL REALITY		Understand the fundamentals of Virtual Reality.
		C02	Comprehend multiple Models of Input and Output Interface in Virtual Reality like Gloves, Video-
		002	based Input, 3D Menus & 3DScanner etc.
		<b>C03</b>	Describe the fundamentals or Advanced topics of
		C03	Computer Graphics.
7FC17			Explain the Interactive Techniques on VR in
		CO4	respect of Body Track, Hand Gesture, 3D Manus,
			Object Grasp.
		CO5	Know about the developments Tools of VR and
			describe.
		CO6	Familiarize the Conceptual idea on Augmented
			Reality and relate the illustrations.
		C01	Describe concepts of Software testing.
		C02	Describe and apply the concepts Flow graphs, Path
		002	testing and Data Flow Testing.

			1	
				Practice Software testing strategy and Environment
			C03	with economics and apply Software Metrics useful
				in software development and maintenance.
				Software Testing Methodology, finding defects
	7F719			hard to find, Verification and validation,
		SOFTWARE	CO4	Functional and structural, Workbench concept,
		AUTOMATION AND	04	Eight Consideration of software testing
	7F719	TESTING		methodology, checklist. Describe Agile computing
				with agile testing.
				Demonstrate Software Testing Techniques such as
			CO5	JADs, Pareto Analysis ,Regression Testing,
			0.05	Structured walkthroughs, Thread testing ,
				Performance testing and White box testing.
				Describe Graph matrices and applications, and
			CO6	practice and apply automated testing tools such
				load Runner, UFT and QTP.
				Get familiarized with the fundamental concepts of
			C01	security attacks, security services.
				Implement the conventional cryptographic
			C02	techniques.
			C03	Simulate the Public key cryptography techniques.
		INFORMATION		Comprehend IP security Architecture and its role
	<b>7EC08</b>	SECURITY	CO4	in security framework.
			CO5	Implement SSL and TLS for Web Security.
			CO6	Design Intrusion Detection Systems and Firewall.
	7F708	LINUX	C01	Describe the basic Linux commands.
	/1/00	PROGRAMMING	C02	Write Shell Scripts.
			C03	Enlist various System Calls in Linux.
				Classify various system calls to handle the
			CO4	processes and signal the process.
			CO5	Elaborate the working of IPC.
			005	Demonstrate the significance of Semaphores for
			CO6	Kernel support and simulate program using the
				same.
			1	Learn the distinction between optimal reasoning
				Vs human like reasoning and formulate an efficient
				problem space for a problem expressed in natural
			C01	language. Also select a search algorithm for a
				problem and estimate its time and space
				complexities.
		ARTIFICIAL	COO	Apply AI techniques to solve problems of game
		INTELLIGENCE	C02	playing, theorem proving, and machine learning.
	7EC20			Learn different knowledge representation
			C03	techniques.
			CC 1	Understand the concepts of state space
	1		1 1 1 1 1	
			CO4	representation, exhaustive search, heuristic search

			together with the time and space complexities.
		CO5	Comprehend the applications of Probabilistic Reasoning and Bayesian Networks.
		CO6	Analyze Supervised Learning Vs. Learning Decision Trees.
		C01	Understand cyber-attacks, types of cybercrimes.
		C02	Realize the importance of cyber security and various forms of cyber attacks and counter measures.
		C03	Get familiarity of cyber forensics.
7FC20	CYBER SECURITY	CO4	Get familiar with obscenity and pornography in cyber space and understand the violation of right of privacy on Internet.
		CO5	Appraise Cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
		CO6	Elucidate the various chapters of the IT Act 2008, power of Central and State Government to make rules under IT Act 2008.
7F778	SOFTWARE AUTOMATION AND TESTING LAB	C01	Prepare Test Plan document and write Test Cases for Small scale Project (Like for their B.Tech IV Year Project or Post-Graduate Projects), they are learn how to Analyze SRS document in order to prepare Test Plan Document.
		C02	Demonstrate skills to use modern software testing tools (EX: UFT, TestLink, Bugzilla, Selenium, Test Director and Quality Center) and test application (web, Window application) by using the tools.
		C03	Demonstrate the ability to differentiate between different Testing tools present in the market (like functional testing tools, Test Management Tools, Bug Tracking Tools and Performance Testing Tools) and prepare Test Plan document and write Test Cases for Small scale Project (Like for their B.Tech IV Year Project or Post-Graduate Projects).
		C01	To understand how to work with Linux commands for handling files, processes, text utilities, backup and network utilities.
		C02	To explore basics of building shell scripts gain knowledge to compose various Shell Scripts.
<b>7F</b> 777	LINUX PROGRAMMING LAB	C03	To learn and demonstrate the I/O functions, low- level system calls System Calls available for file and directory handling.
		004	To gain knowledge in implementing processes

			aspects, mastering the process APIs.
			To understand how to implement pipes, FIFO, how
		CO5	to use for communication purpose in IPC.
			To understand the significance of Semaphores for
		CO6	Kernel support and simulate program using the
			same.
		C01	Design and Implement symmetric key encryption algorithms.
		C02	Simulate asymmetric key encryption algorithms.
		C03	Implement hashing and key exchange algorithms.
7EC76	INFORMATION SECURITY LAB	CO4	Simulate and execute Digital Signature and Digital envelope.
		CO5	Install and execute various projects in NS3.
		C01	Develop plans with relevant people to achieve the project's goals.
76794	PROJECT - I	C02	Break work down into tasks and determine handover procedures.
7E784		C03	Identify links and dependencies, and schedule to achieve deliverables.
		CO4	Estimate the human and physical resources required, and make plans to obtain the necessary resources.
		CO5	Allocate roles with clear lines of responsibility and
			accountability with team spirit. Design and develop the software or prototype to
		CO6	meet societal needs.
		C01	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
	SUMMER INDUSTRY	C02	Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
7E682	INTERNSHIP-II	C03	Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
		CO4	Improve their communicative skills and team skills largely improve.
		CO5	Work as an individual and in a team.
		COA	The students gain the knowledge on the inputs
		C01	required for innovation and also gain familiarity on Entrepreneurship.
		C02	The students will get exposure on creative methods of ideation and the importance of protecting the ideas.

		INNOVATION AND	C03	The students gain knowledge on design thinking
	7ZC24	DESIGN THINKING	CO4	and types of thinking. The students gain familiarity on emerging technologies like Internet of things (IOT).
IV-II &			CO5	The students understand the process of building the startup.
A18			CO6	The students gain knowledge on various startup funding and also to branding building for the startup.
	7ZC27	INDIAN HISTORY, CULTURE AND	C01	To appreciate and understand our Indian History, Culture and Indian heritage.
		GEOGRAPHY	C02	To understand secularism of our country.
			C03	To appreciate and understand the social reformers who brought revolutionary changes in Indian society.
			CO4	To understand earth evolution and world climatic change.
			CO5	To understand India Oceanography, Able to enhance and understand Indian monsoons, Indian agriculture.
			C01	This unit enables the students to understand the financial structure and the financial sector reforms after 1991.
		FINANCIAL INSTITUTIONS, MARKETS AND SERVICES	C02	The unit gives the exposure on the role of RBI and the Regulating and credit policies adopted by the RBI.
			C03	The students get awareness on the role of Non- Banking financial institutions and the role of financial institutions in India.
	7ZC15		CO4	The unit educates the students to know the role of regulatory bodies like SEBI and also to know the capital and money market instruments.
			CO5	The unit equips the students to understand about the asset fund based financial services.
			CO6	The students will get exposure about the investment banking and merchant banking.
			C01	Understand the need for manufacturing processes and various material properties.
			C02	Understand the principle of casting, Patterns used, Pattern allowance and Gating systems used in casting, and various casting methods.
			C03	Understand the basic principle of welding and distinguish between various welding types and their applications.
		PRINCIPLES OF	<b>CO4</b>	Understand the principles of metal working,

	MANUFACTURING		various types of metal working techniques,
	PROCESSES		Knowledge of hot working and cold working,
7BC52			Ability to understand the bulk deformation
			processes of rolling. Understand the bulk deformation processes of
		CO5	extrusion and forging, their applications and forces
			involved in these operations.
		CO6	Understand and distinguish the various press
			working operations with respect to their
			applications, advantages and disadvantages,
			understand the various types of plastics and their
<b>E</b> A (145			processing techniques.
7AC45	FUNDAMENTALS OF RENEWABLE		Understand the role and potential of new and renewable energy sources realize the potential of
	ENERGY SOURCES		solar energy, its impact on environment; define and
		C01	understand the terms describing the different
			angles that one may incur in setting up a solar
			panel and be able to use the instruments for measuring solar radiation.
		C02	Demonstrates the knowledge of different
		02	techniques of solar collection and storage.
			The student becomes familiar with the different
			types of horizontal and vertical axis wind mills and understands the performance characteristics of the
		C03	same. The student also demonstrates the
			knowledge of different Bio-gas digesters and
			factors influencing its yield.
		CO4	Aware of the potential of geothermal energy in India and will be able to characterize different
			types of geothermal wells.
		~~~	Aware of the different methods of kinetic energy
		CO5	extraction from Ocean waves and tides and thermal
		CO6	energy extraction from Oceans. Demonstrates the knowledge of Direct Energy
			Conversion in different phenomena viz., Joule
			Thomson effect, Seebeck effect, Peltier effect etc.
			and the principle of operation of Fuel Cells.
		CO1	Analyse and Design of BJT Single stage,
			multistage amplifiers at low and high frequencies.
		C02	Analyse and Design JFET and MOSFET
			amplifiers. Design different types of Feedback Amplifier,
	ELECTRONICS CIRCUIT DESIGN	C03	Oscillators and their analysis.
7CC44	AND ANALYSIS	CO4	Analyse and Design power amplifiers. Understand
			distortions.

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				Analyse and Design tuned and RF amplifiers such
			CO5	as single tuned, double tuned, stagger tuned and
				wide band amplifier.
			CO6	Understand the stability of oscillators and tuned
				amplifiers.
			CO1	Recognize of the principles of mobile ad hoc
		MOBILE ADHOC AND	001	networks (MANETs) and what distinguishes them
		SENSOR NETWORKS		from infrastructure-based networks.
		SERVER I LI WORKS		Comprehend the characteristics of wireless sensor
	7EC15		C02	networks (WSNs).
				Report how proactive protocols function and their
			C03	implications on data transmission delay and
			0.05	-
				bandwidth consumption.
			CO4	Assess how reactive routing protocols function and
			04	their implications on data transmission delay and
				bandwidth consumption.
			COF	Analyze the functioning of proactive routing
			CO5	protocols and their implications on data
			00(	transmission delay and bandwidth consumption.
			CO6	Analyze the functioning of reactive routing
				protocols and their implications on data
				transmission delay and bandwidth consumption.
				And become familiar with the mechanisms for
				implementing security and trust mechanisms in
			001	MANETs and WSNs.
			CO1	Understand the issues affecting the organization,
				planning, and development of large and complex
	7FC13			software systems.
			C02	Understand the concepts of software metrics and
		ADVANCED		reuse-based software engineering.
		SOFTWARE ENGINEERING	C03	Apply software engineering principles in the
				development of distributed software systems.
			CO4	Design and implement service-oriented software
				systems.
			CO5	Understand the design and development of aspect-
				oriented software systems.
			CO6	Understand software re-engineering process model.
			CO1	Describe the characteristics of cloud.
			C02	Describe the cloud services.
				Understand different architectures for cloud
			C03	applications, Creation and running of python
	7EC21	CLOUD		programs, running amazon ec2 instance
	12021	CLOUD		Understand Data Intensive applications and future
			CO4	trends of Internet Clouds supporting Mobile
			004	Computing, Ubiquitious Computing and Social
				Networking.
				-

			CO5	Discuss mapreduce and image processing app on cloud.		
			CO6	Discuss cloud security architecture.		
			CO1	Get familiar with terminology, technology and applications of IoT.		
	7DC55	INTERNET OF THINGS	C02	Understand and explain IoT system management using M2M (machine to machine) with necessary protocols.		
			C03	Design and develop Python Scripting Language programs preferred for many IoT applications.		
			CO4	Use Raspberry PI as a hardware platform for designing the IoT sensor interfacing.		
			CO5	Implement web based services for IoT.		
			CO6	Understand and analyze the case studies illustrating IoT Design.		
			CO1	Develop plans with relevant people to achieve the project's goals.		
			C02	Break work down into tasks and determine handover procedures.		
	50005		C03	Identify links and dependencies, and schedule to achieve deliverables.		
	7E885 P	PROJECT - II	CO4	Estimate the human and physical resources required, and make plans to obtain the necessary resources.		
			CO5	Allocate roles with clear lines of responsibility and accountability with team spirit.		
			CO6	Design and develop the software or prototype using modern software tools wherever applicable to meet societal needs.		



## Course Outcomes of IT Department

SREENIDHI INSTITUTE OF SCIENCE AND





Department of Information Technology COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and	Course	Course Name		Co's
Regulation	Code			
			C01	Understand and analyze microscopic chemistry in terms of atomic orbital's, molecular orbital's and intermolecular forces.
			C02	Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.
	9HC04	Engineering	C03	Recognize and select the domestic and industrial problems caused by hardwater and also learn about the municipal water treatment using various methods.
		Chemistry	C04	Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
			C05	Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques.
			C06	Understand the synthesis of drug molecules and learn fundamentals of analytical techniques like electronic, vibrational and rotational spectroscopy.
	9FC01	Problem Solving using C	C01	Formulate simple algorithms for arithmetic, logical problems and to translate the algorithms to programs (in C language).
I-I & A22			C02	Execute and test the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion.
			C03	Distinguish a problem into functions and synthesize a complete program using divide and conquer approach.
			C04	Understand arrays, pointers and structures to formulate algorithms and programs.
			C05	Analyse programming to solve matrix addition and multiplication problems and searching and sorting problems.
			C06	Understand programming to solve simple numerical method problems, namely root finding of function, differentiation of function and simple integration.
		Matrix Algebra and	C01	Check the consistency or inconsistency of a linear system and can solve the problems.
	9HC11	Calculus	C02	Find the Eigen values and Eigen vectors and can solve the problems associated with these concepts.
			C03	Find the nature, index and signature of the quadratic

				lubricant, acid value of an oil.
			C03	Estimate hardness of water.
			C03	Analyze the amount of chloride content.
			004	Determine cell constant and conductance of
			C05	solutions, redox potential and emf of solutions, the
				rate constant of acid.
			C06	Synthesize a polymer (Thiakol rubber / Urea-
				Farmaldehyde resin), a drug- Aspirin.
			C07	Estimate of Mn+7 by Colorimetry method.
			C01	Understand various types of conventional manufacturing Processes.
		Workshop/	C02	Describe manufacturing components from wood, MS flat, GI Sheet etc. – hands on experience.
	9BC61	Manufacturing Process Lab	C03	Illustrate Manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.
			C04	Produce small devices / products /appliances by assembling different components.
	9НС07	Engineering Physics	C01	Differentiate the wave and particle, de-Broglie matter waves-its experimental evidence, Schroedinger's wave concept and its application for a particle in one dimension box.
			C02	Explain about emission, its types, laser principle, types, working and its applications and to reveals about TIR principle, optical fiber-types and signal propagation, attenuation, communication system and applications of optical fibers (sensors and medical endoscopy).
I-II & A22			C03	Classify magnetism types, Hysteresis, domain theory, Anti-ferro and ferri-magnetism, Superconductivity, experimental facts, theoretical analysis, types of superconductors and its applications.
			C04	Explain the basic concepts of dielectric materials, polarization and its types, local fields, frequency and temperature effect on dielectrics and their applications (piezo, ferro and Pyro electricity).
			CO	Elaborate semiconductor behavior, types, carrier
			5	concentration, Hall effect, Thermistor, demonstrate and analyze semiconductor devices like a PN- junction, I-V characteristics, LED, solar cell, photo diodo and their applications.
			СО	diode and their applications. Summarize Nano & bulk concepts, surface to
			6	volume ratio, quantum confinement, CNTs and
			U	preparation methods (physical & chemical), analysis the techniques like XRD, SEM, TEM and

				form.
				Verify the applicability of mean value theorems and
			C04	also can express the given standard function in
			001	series form using Taylor's and Maclaurin series.
				Find the solutions of first order first degree
				differential equations and solve the problems on
			C05	Newton's law of cooling, Natural growth and
				decay.
				Solve higher order ordinary differential equations
			C06	with constant coefficients using some standard
				methods.
			C01	Demonstrate competence with suitable accuracy in
			COI	vocabulary, and language fluency.
		<b>English-Essential</b>	C02	State the definition of nouns, verbs, adjectives, and
	9HC01	English Language	C02	adverbs.
	711001	Skills	C03	Identify the differences of each tense and use the
			000	tenses accurately.
			C04	Identify specialized reading strategies for specific
				types of texts.
			C05	Produce written work that is substantive, organized,
				and grammatically accurate.
	9HC61	Oral Communications Lab-1	C01	Describe people, objects and situations using simple
				sentences.
			C02	Use appropriate tenses and expressions in different contexts of conversations.
				Identify major areas of concern in their oral
			C03	communication and address them.
				Create a SMART plan to enhance their
			C04	communication skills in English.
			C01	Enumerate the algorithms for simple problems.
				Classify the given algorithms to a working and
			C02	correct program.
			C02	Correct the syntax errors as reported by the
			C03	compilers.
		Duchlow Coluin	C04	Identify and correct logical errors encountered at
	<b>AF</b> OST	Problem Solving using C Lab	004	run time.
	9FC61	U Lau	C05	Write iterative as well as recursive programs.
			<u> </u>	Represent data in arrays, strings and structures and
			C06	manipulate them through a program.
			C07	Declare pointers of different types and use them in
				defining self referential structures.
			CO	Create, read and write to and from simple text files.
			8	
		Engineering	C01	Prepare the Inorganic compounds.
	9HC64	Chemistry Lab	<b>C02</b>	Determine surface tension of a liquid, viscosity of

<b></b>		[		
				also to understand the radioactivity, fusion & fission, alpha, beta and gamma rays decay and its applications.
			C01	Demonstrate the concepts of Abstract data type and also applications of stack and Queues.
			C02	Select the data structures that efficiently model the information in a problem.
		Dete	C03	Design programs using variety of data structures including Trees, AVL Trees and Graphs and their applications.
	9EC01	Data Structures	C04	Solve problems and also assess efficiency trade off among searching and sorting using time complexity of each algorithm and also the applications of hashing and hash tables.
			CO 5	Describe the concepts of OOPs and implement programs using objects, classes, constructors and destructors.
			CO 6	Apply concepts of OOPs to write program on over loading functions and concepts of Inheritance.
			C01	Find the limits and test for the continuity and differentiability of a function.
	9НС12	ADVANCED CALCULUS	C02	Solve the problems on multiple integrals.
			C03	Solve linear and nonlinear first order partial differential equations.
			C04	Find Series expansion a function defined over the intervals.
			CO 5	Find directional derivative, gradient, divergence and curl of a function.
			CO	Solve problems of line, surface and volume
			6 C01	integrals. Understand and apply the principles of electrical
	9AC48	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	C02	engineering to solve basic equations. Apply the knowledge gained to explain the principles of single and three phase AC circuits.
			C03	Apply the knowledge gained to explain the principle and operation of DC machine along with its applications.
			C04	Use the principles of single phase transformer along with its applications and solve the equations.
			CO 5	Realize the principle and operation of three phase induction motor with its applications.
			CO	Understand the operation of different measuring
			6	instruments along with its applications.
	9BC01	ENGINEERING GRAPHICS	C01	Understand the instruments to solve the engineering problem and draw various type of curves used in

				engineering.
				Implement Orthographic projections and draw
			C02	projections of simple drawing entities such as points
				Lines, and Planes.
			-	Draw projections of different types of regular solids
			C03	in various positions wrt principal planes of
				projection.
				Draw Sections of various Solids including
			C04	Cylinders, cones, prisms and pyramids and draw the
			~~~	developments of these solids and their sections.
			CO	Construct Isometric Scale, Isometric Projections
			5	and Views and convert 3D views to 2D
			СО	orthographic views. Understand from basic sketching through 2D and 3-
			6	D solid modeling using computer aided design
			U	(CAD) software.
			C01	Understand, Analyse and respond to the audience
		ORAL COMMUNICATION LAB – II	CUI	by listening effectively.
	9НС62		C02	Practice effectively the speaking skills with the apt
				body language.
			C03	Develop strategies to improve speaking skills.
			C04	Plan, prepare and present effectively to meet the
				standards of corporate and real world in a group.
			CO	Comprehend the reading skills through note taking
			5	and other study skills.
			CO	Express the opinions effectively on the given topic
			6	through role play and situational dialogues in group
				discussions.
			C01	Understand the concepts of photo electric effect, importance, photo current, colour filters, optical
			COI	sensors.
				Know about the light properties-dispersion, prism,
			C02	spectrometer and minimum deviation arrangement.
			C03	Recognize the difference between the interference
			003	and diffraction, grating, laser characteristics.
	9HC66	ENGINEERING		Analyze the concepts of fiber optics, fundamentals,
		PHYSICS LAB	C04	numerical aperture its importance, attenuation in
				fiber and applications.
			CO	Understand and search to apply the fundamentals of
		5	magnetic induction, Ampere's law, Oersted's law and the Biot-Savart law.	
			СО	Know the difference between AC and DC
			6	fundamentals, Magnetostriction, resonance, air
			U	column vibrations.
			C07	Analyze the LCR circuit combination, parallel,
				series electrical resonance, inductance, reactance,

				capacitance and electrical and electronic
				fundamentals.
			C08	Summarize the fundamentals of modulus-types, stress, strain, elasticity, plasticity and Hook's law.
			C09	Analyze the concept a semiconductors, types, calculation of energy gap of a semiconductor diode and importance.
			C01 0	Analyze the difference between normal diode & LED, forward bias, reverse bias, I-V characteristics, direct and indirect band gap semiconductors.
			CO 11	Characterize the RC network, time constant, capacitor functioning and its application.
			C01	Implement Stacks, Queues and circular queues.
		DATA STRUCTURES	C02	Write programs using tree traversals. Inorder, Preorder and Postorder.
	9EC61	Lab Using C	C03	Program searching, sorting and hashing operations.
	12001		C04	Write programs on Binary trees.
			C05	Implement classes and operator overloading.
			CO1	Understand and apply the principles of electrical engineering to solve basic equations.
	8AC41 BASIC ELECTRICAL ENGINEERING		CO2	Apply the knowledge gained to explain the principles of single and three phase AC circuits.
			CO3	Apply the knowledge gained to explain the principle and operation of DC machine along with its applications.
			CO4	Use the principles of single phase transformer along with its applications and solve the equations.
			CO5	Realize the principle and operation of three phase induction motor with its applications.
			CO6	
			CO1	Understand the Fundamentals of diode & BJT operation, Characteristics, diode application as rectifiers.
			CO2	Comprehend different biasing circuits of BJT amplifiers.
	8CC54	ANALOG ELECTRONIC CIRCUITS	CO3	Analyze small signal model of BJT with h-parameters.
II-I & A20			CO4	Describe the working and construction of FETs and characteristics & biasing of FET and Analyze the small signal model of FET.
			CO5	Understand the fundamentals of JFET and its operation and characteristics.
			CO6	Determine the feedback and analysis of oscillators.

			1	Commend the first-served 1 C
			CO1	Comprehend the fundamentals of Java,
				Classes, Objects and design the java programs using
			<u> </u>	constructors and String handling methods. Design the programs using inheritance,
		<b>OBJECT ORIENTED</b>	CO2	Design the programs using inheritance, polymorphism and interface.
		PROGRAMMING	CO3	Develop programs using Packages, I/O Streams
	8EC02	THROUGH JAVA	005	and collections.
			CO4	Apply the concepts of Exception handling and
			001	Multithreading for various scenarios.
			CO5	Create programs using AWT, Swings and develop
				applications using event handling.
			CO6	Develop applications using Applets and client
				server programs using networking concepts.
			CO1	Define the syntax and semantics of propositional
				logic.
			CO2	Translate statements from a natural language into
				its symbolic structures in logic.
				Prove elementary properties of modular arithmetic
		DISCRETE MATHEMATICS	CO3	and explain their applications in Computer Science,
	8F303			for example, in cryptography and hashing
				algorithms.
			CO4	Apply the notion of relations on some finite structures, like strings and databases.
			CO5	Analyze algorithms using the concept of functions
				and function complexity.
				Apply graph theory models of data structures and
			CO6	state machines to solve problems of connectivity
				and constraint satisfaction, for example,
				scheduling.
			C01	Perceive basic operational concept of computer and
				data processing.
		COMPUTER	CO2	Use data types with instruction set of specified
		ORGANIZATION		architecture.
	8DC12		CO3	Justify different control unit design and algorithms
			<u> </u>	for various operations.
			CO4	Elaborate basic architecture of 8086 processor.
			CO5	Write assembly language programming and debug to 8086.
			CO6	
			C00	Interface devices to 8086 processor.
				Assess themselves using SWOT analysis. Appraise the importance of certain soft skills like
			CO2	time management and goal setting.
	8HC03		CO3	Improve their verbal ability to handle the
		SOFT SKILLS		competitive exams.
			CO4	Enhance their team skills and design thinking
				capabilities for effective problem solving and
L			L	ing and the encente problem borting and

			decision making.
			Know their emotional quotient which guides their
		CO5	1 0
			thinking, behavior and helps them manage stress
			efficiently.
		CO6	Equip themselves with the prerequisites, and
		000	relevant techniques to effectively attend corporate
			interviews.
			This course also discusses their role in their family.
	UNIVERSAL HUMAN		It, very briefly, touches issues related to their role
	VALUES	CO1	in the society and the nature, which needs to be
			discussed at length in one more semester for which
			the foundation course named as "H-102 Universal
8HC17			Human Values.
			Understanding Harmony is designed which may be
			covered in their III or IV semester. During the
		~ ~ ~	Induction Program, students would get an initial
		CO2	exposure to human values through Universal
			Human Values – I. This exposure is to be
			augmented by this compulsory full semester
			foundation course.
		001	Evaluate programs to generate Prime numbers,
		CO1	Roots of quadratic equation and Fibonacci series.
		<b>G 0 1</b>	Implement small application such as banking
	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	CO2	system.
			Compare programs on operator, function
		CO3	overloading and dynamic method dispatch.
8EC62		<b>GO</b> 4	Evaluate programs to implement interface and
		CO4	packages.
		CO5	Explain and write programs to implement threads.
		GOL	Illustrate programs to implement applets and event
		CO6	handling.
		<b>CO7</b>	Illustrate an application to implement client and
			server scenario.
			Understand the working of single-phase
			transformer under different conditions, the
		CO1	performance of three phase induction motor,
			different speed control methods of DC motor with
			and without loading with its performance.
			Understand the applications of Thevenin's
	BASIC ELECTRICAL	CO2	Theorem in circuit analysis.
	ENGINEERING AND		Identify, Specify and test R, L, C Components
8AC91	ANALOG	CO3	(Colour Codes), Potentiometers, Switches, Coils,
	ELECTRONICS		Relays.
	CIRCUITS LAB		Identify, Specify and test Active Devices, Diodes,
		CO4	BJTs, Low power JFETs.
		CO5	Explain and demonstrate working of PN Junction
		005	Explain and demonstrate working of PIN Junction

				and Zener diode.
				Explain and demonstrate working Half and Full
			CO6	wave Rectifier without filters.
			<b>CO7</b>	Demonstrate working of CE characteristics and its
				application as an amplifier.
				Familiarize the architecture of 8086 processor,
			CO1	assembling language programming and interfacing
	8DC62	COMPUTER		with various modules.
		ORGANIZATION LAB	CO2	Experiment with Arithmetic operations of binary
			002	number system.
				Simulate any type of VLSI, embedded systems,
			CO3	industrial and real time applications by knowing
				the concepts of Microprocessor and
			CO1	Microcontrollers.
	0.5.0.50	COMPREHENSIVE	CO1	Assessed the knowledge of the students in the Core
	8E378	TEST AND VIVA-		and Elective subjects that they have studied till the completion of that academic year.
		VOCE		completion of that academic year.
			~~ 1	Identify topics related to Computer Scienec and
		TECHNICAL SEMINAR - III	CO1	Engineering domain.
	8E386		CO2	Collect, survey and organize content in PPT form.
			CO3	Present seminar in an effective manner.
			<u> </u>	Solve the random variable problems and
			CO1	probability distributions.
	8HC16		CO2	Estimate the parameters and solve the problems
			02	using central limit theorem.
			CO3	Test the hypothesis related to samples concerning
			000	to the means and proportions of large size samples.
				Apply and solve the problems using t-test, Chi-
	опсто	PROBABILITY AND STATISTICS	CO4	square test also testing the hypothesis problems on
		5141151105		small size samples, goodness of fit and
				independence of attributes. Solve the problems on measures of central
II-II& A20			CO5	tendency, Correlation.
				Classify and differentiate various regression
			CO6	models.
			CO1	Apply the rules of Boolean algebra to simplify
			CO1	Boolean expressions.
	8CC55 DIGITAL		CO2	Simplify of Boolean expressions using K-map.
		ELECTRONICS		Design MSI combinational circuits such as full
			CO3	adders, multiplexers, decoders, encoders. Code
				converters.
				Design basic memory units (latches and flip-flops)
			CO4	and sequential circuits such as counters and
				registers

		Γ	1	,
			CO5	Create digital design using PLD's such as ROM's, PLA's, PAL s.
			CO6	Design the digital controllers using Algorithmic State Machine Charts.
			CO1	Analyze worst-case running times of algorithms
				using asymptotic analysis. Synthesize divide and-conquer algorithms. Derive
			CO2	and solve recurrences describing the performance of divide-and-conquer algorithms.
	0000	DESIGN AND		Describe the greedy paradigm and explain when an
	8FC05	ANALYSIS OF	CO3	algorithmic design situation calls for it. Recite
		ALGORITHMS	000	algorithms that employ this paradigm. Synthesize
				greedy algorithms, and analyze them.
			CO4	Comprehend the concept of dynamic programming algorithms, their applications and analyze them.
				Analyze the Backtracking and Branch and Bound
			CO5	algorithms and also identify the scenarios for its
				applicability.
			CO6	Comprehend the concept of P and NP Problems
			000	and its usage in the applications.
			601	Analyze importance and significance of models,
			CO1	Database languages, architecture and design of Data Base Systems.
				Understand Relational Model – Integrity
			CO2	Constraints, Logic.
				Analyse data base Design and Views of databases,
			CO3	queries using Relational Algebra and Relational
				Calculus.
			CO4	Solve Queries with Comparison Operators, Aggregative Operators and nested queries. Queries
			CO4	with joins.
	8EC03	DATABASE	CO5	Apply Schema refinement through all forms of
		MANAGEMENT SYSTEMS		Normalization to eliminate database redundancy.
	51512/45		Apply ACID properties in transaction. Ensuring	
			CO6	serializability in concurrent transactions. Concurrent control methods and recovery of
				transaction.
			CO7	Analyze External Storage Organization
				mechanisms and apply Indexing in databases for
	SOFTWARE ENGINEERING AND 8F404 OOAD		query optimization to enhance system performance.	
			Identify software process and software engineering	
		CO1	practices to select and justify approaches for a given project and its constraints and distinguish	
				given project and its constraints and distinguish lifecycles for developing software product.
			Describe the importance and principles of Unified	
			CO2	Modeling Language, its building blocks and to

				unlate UNI manadiana fan muchlana aglaing
				relate UML paradigm for problem solving.
			CO3	Define and design models for the requirements stated in the software project.
			CO4	Comprehend what and how to gather the requirements for a project.
			CO5	Design class, object and interactive diagrams and
			005	know their significance of an application.
			CO6	Design advanced behavioral and architectural modeling and work on case studies.
			CO1	Acquire the basics of Managerial Economics at Micro level, Demand analysis and production analysis in particular.
			CO2	Expose on Cost concept, Revenues and Market structure and describe the concepts.
82	ZC01	ECONOMICS, ACCOUNTANCY AND MANACEMENT	CO3	Understand the basic concepts of Accounting, Double entry system and Bookkeeping.
	MANAGEMENT SCIENCE		CO4	Interpret the concepts of Capital expenditure, Revenue expenditure and Final accounts ad their significance.
			CO5	Identify knowledge and elaborate the basics of Management, its principles and various functions performed in organization.
			CO6	Recognize various personality traits, perception, attitudes of individuals working in organization.
81	HC05	ENVIRONMENTAL SCIENCE AND	CO1	Understand about ecosystem and energy flow among the organisms.
		ECOLOGY	CO2	Know the resources available, use of them and
			CO3	overexploitation of the resources in the nature. Learn the value, use and value of biodiversity.
			CO4	Understand the causes and effect of pollution and
			cor	implement measures in control of pollution. Understand the sustainable development and
			CO5	implement green technology for sustainable development.
			CO6	Learn and implement policy to protect the environment
		DATABASE	CO1	Understand how to create tables for a database and apply Queries using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
81	8EC63 MANAGEMENT SYSTEMS LAB	CO2	Explore Queries using Aggregate functions such as [COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING], Conversion functions and use string functions for a given emplication	
			CO3	functions for a given application. Learn and demonstrate write programs using PL/SQL programs using exceptions, COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block

			CO4	Gain knowledge in implementing programs using WHILE LOOPS, FOR LOOPS, nested loops using BUILT– IN Exceptions and Implement Procedures.
			CO5	Understand Programs for stored functions invoke functions in SQL Statement and Implement programs for packages specification.
			CO6	Know the significance and Implement programs using features of CURSORs and its variables and develop Programs implementing Triggers.
			CO1	Identify software process and software engineering practices to select and
			CO2	Justify approaches for a given project and its constraints and distinguish life cycles for developing software product.
	8FC63	COMPUTER AIDED SOFTWARE ENGINEERING	CO3	Understand the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving.
	86.03	(CASE) TOOLS LAB	CO4	Define and design models for the requirements stated in the software project.
			CO5	Design class, object and interactive diagrams and know their significance.
			CO6	Design advanced behavioral and architectural modeling and work on case
			CO1	Implement Merge sort algorithm for sorting a list of integers in ascending order, Dijkstra's algorithm for the single source shortest path problem.
		DESIGN AND ANALYSIS OF ALGORITHMS LAB	CO2	Implement Prim's algorithm to generate minimum cost spanning tree.
			CO3	Solve the job sequencing with deadlines problem using greedy algorithm.
			CO4	Design the solution for the 0/1 knapsack problem using implement Dynamic Programming and implement.
			CO5	Using Dynamic programming approach solve the Optimal Binary search Tree problem.
			CO6	Design and implement n-queens problem using backtracking approach.
	8E479	COMPREHENSIVE TEST AND VIVA VOCE - IV	CO1	Asses the knowledge of the students in the Core and Elective subjects that they have studied till the completion of that academic year.
			CO1	Identify topics related to Computer Scienec and Engineering domain or disruptive technologies.
	8E487	TECHNICAL SEMINAR – IV	CO2 CO3	Collect, survey and organize content in PPT form. Present seminar in an effective manner.

	8E491	SUMMER BREAK		
		INTERNSHIP – I		The students will exercise basis becauled as
			CO1	The students will acquire basic knowledge on Skills of Entrepreneurship.
			CO2	The students will understand the techniques of selecting the customers through the process of customer segmentation and Targeting.
	8ZC22	BASICS OF ENTREPRENEURSHIP	CO3	Business Models and their validity are understood by the students.
III-I &			CO4	The basic cost structure, Revenue Streams and the pricing strategies are understood by the students.
A20			CO5	The students will acquire knowledge about the project management and its techniques.
			CO6	The students get exposure on marketing strategies and business regulations for the Start up.
			CO1	Gain knowledge relating to Economics, various sectors and its growth.
			CO2	Will gain knowledge relating to various concepts of National income and related aggregates.
	8ZC25	BASICS OF INDIAN ECONOMY	CO3	Students will learn about Indian Industrial policy and benefits of LPG to India.
			CO4	Comprehend knowledge relating to Fiscal policy & Taxation system in India.
			CO5	Learn about inflation & business cycles.
			CO6	Know about the BoP and its influence on economy.
		BANKING OPERATIONS, INSURANCE AND RISK MANAGEMENT	CO1	Describe the new dimensions and products served by the banking system in INDIA.
			CO2	Explain the credit control system and create awareness on NPA's.
	8ZC05		CO3	Apply the knowledge of Insurance concepts in real life scenarios.
			CO4	Recognize the importance of regulatory and legal frame work of IRDA.
			CO5	Identify the risk management process and methods.
			CO6	Calculate the diversity of risk and return.
			CO1	Understand the Additive manufacturing processes and their relationship with subtractive manufacturing.
		INTRODUCTION TO	CO2	Demonstrate comprehensive knowledge of the broad range of liquid based rapid prototype processes, devices, capabilities and materials that are available.
	8BC51	ADDITIVE MANUFACTURING PROCESS	CO3	Apply the principles of casting in Additive manufacturing processes.
			CO4	Articulate the various tradeoffs of Additive manufacturing software's/data format that must be

			T	made in selecting advanced/additive manufacturing
				made in selecting advanced/additive manufacturing processes, devices and materials to suit particular
				product requirements.
				Learn various applications of additive
			CO5	manufacturing, such as in architecture art, health
			000	care direct part production and mass customization.
		CONTROL SYSTEM	CO1	Understand basic concepts of control systems.
		ENGINEERING	CO2	Study about time response analysis.
	8AC46		02	Understand basic concepts of stability and root
	8AC40		CO3	locus method.
			<b>CO4</b>	Study about frequency response analysis.
			04	
			CO5	Learn basic concepts stability analysis in frequency domain.
			CO6	
			C00	Outline fundamentals of state space analysis.
			CO1 CO2	Classify embedded systems and their applications. Write ALP for 8051 architecture.
			CO3	Implement interfaces for Embedded System using
				various protocols and hardware modules.
			CO4	Understand the principles of Communication Interface, Wireless and Mobile Systems Protocols
	8DC42	EMBEDDED		Design the interrupt routines for variois OS
			CO5	concepts and Memory Management techniques in
			005	an RTOS Environment.
				Recognize the issues and design of basic Real-
			GOL	Time Operating System principles, Semaphores
			CO6	and Queues, Hard Real-Time Scheduling
				Considerations.
				Gain the knowledge on the inputs required for
			CO1	design thinking and also gain familiarity on
			_	concepts related to design thinking.
	07.000		CO2	Understand the techniques of idea generation.
	8ZC08	DESIGN LITERACY AND DESIGN	CO3	Classify different phases of design thinking.
		THINKING	CO4	Realize the product design process.
			CO5	Understand design thinking for service design.
			CO6	Gain knowledge on various cases related to design
				thinking.
			C01	Appraise the role of the Web, its need and
			cor	Intelligence.
		SEMANTIC WEB &		Outline the concepts of Machine Intelligence
		SOCIAL NETWORKS	CO2	Ontology, Inference engines, Software Agents,
				Berners-Lee www and Semantic Road Map.
				Conceptualize Knowledge Representation for the
				Semantic Web with Resource Description
			CO3	Framework (RDF) / RDF Schema, Ontology Web
				Language (OWL),
				UML and XML Schema.

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			CO4	Apply Ontology Engineering using Ontology Development Tools/ Methods, Ontology Libraries, Ontology Mapping, Logic and Inference Engines.
			CO5	Illustrate Semantic Web Applications, Services and Technology.
			CO6	Apply Social Network Analysis, Semantic web networks analysis and describe Building of Semantic Web Applications with social network features.
			CO1	Explain Architecture Business Cycle, Architectural patterns, reference models, reference architectures, and architecture structures.
			CO2	Describe architecture, Quality Attributes, styles, patterns and design of Architecture along with the Documentation of architecture.
	SOFTWARE ARCHITECTURE AND 8FC12 DESIGN PATTERNS	ARCHITECTURE AND	CO3	Discuss Software Architecture evaluation, Architecture design decision making, SAAM, ATAM and CBAM. And plan software architecture in future.
		<b>CO4</b>	Plan and use Creational patterns and Structural patterns application development.	
			CO5	Solving problems using Induction learning, Decision Tree, Statistical learning methods, learning with hidden variables, EM algorithm, Instance based learning and Neural Networks.
			CO6	Explain Behavioral patterns using Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy, Template method and Visitor.
			CO1	Understand basic terms related to Big Data, Data Science and Analysis of Data. Learn Statistical Inference, Probability Distributions and Fitting a model.
	9EC16	INTRODUCTION TO	CO2	Implement Data analysis techniques for solving practical problems.
	8EC16		CO3	Perform Data analysis on variety of data using R.
	DATA SCIENCE	DATA SCIENCE	CO4	Exercise appropriate manipulation techniques on lists and vectors using operators in R. Comprehend the significance and use the iterative programming and functions in R.
			CO5	Learn and describe the various Dimensionality Reduction techniques available.
			CO6	Apply the suitable visualization techniques to output analytical results.
			CO1	Understandfundamental terms in Computer Graphics, various visible surface determination algorithms and midpoint and line segment analysis.

				Explore 2D graphics and algorithms including: line
			CO2	drawing, polygon filling, clipping, and
				transformations.
			CO3	Apply functions 2D viewing and apply clipping
				algorithms.
	8FC17	COMPUTER		Understand the concepts and techniques used in 3D
	01 017	GRAPHICS	CO4	computer graphics, including viewing
				transformations, hierarchical modeling, color,
				lighting and texture mapping.
			005	Apply single and multiple 3-D viewing techniques
			CO5	like viewing coordinates etc and also back-face
				detection, depth-buffer, and scan-line methods.
			CO6	Analyze the animation production pipeline and
				Produce a short animation.
			C01	Understand the fundamental concepts of Security Attacks and security standards with the model for
			COI	network Security.
				Review and analyze conventional cryptographic
			CO2	techniques and authentication.
				Review and analyze public cryptographic
	8FC06	INFORMATION SECURITY	CO3	techniques and outline the concepts of Kerberos
				and email privacy.
			CO4	Recognize architecture, key management and
				header formats of IPSEC.
			CO5	Outline the various web security threats and
			0.05	protocols.
			CO6	Understand Intrusion Detection System and Design
			000	principles of Firewalls.
			CO1	Understand the fundamentals of Data Mining and
	OF COA	DATA WAREHOUSING AND		Identify the techniques used in data preprocessing.
	8EC04	DATA MINING	<b>CO3</b>	Understand the fundamentals of Data Warehousing
			CO2	and issues of mining with respect to architectures,
				technologies such as OLAP.
			CO3	Learn insights of Data Mining Primitives and Infer the significance of Concept Description.
				Apply the algorithms for mining association rules
			CO4	in large databases.
				Discuss and apply the models of classification and
			CO5	use those models for the prediction of the new
			_	samples.
				Apply various clustering techniques available for
			CO6	numerous applications. Identify the optimal
				clustering technique for a particular application.
			CO1	Understand concepts of different networks,
				network models and transmission medias.
			CO2	Classify various data conversion techniques and

				Malinharing Develightering to the image
				Multiplexing, Demultiplexing techniques.
			CO3	Summarize the design issues of Datalink layer and
				solve problems on Error and Flow control.
8	BEC05	DATA COMMUNICATIONS AND NETWORKS	CO4	Infer MAC layer protocols, various connecting devices, IP addressing concepts and design a network(using subnetting and supernetting techniques).
			CO5	Analyze various routing algorithms and outline the concepts of Internet control protocols and congestion control techniques.
			CO6	Recognize services and protocols of transport layer, application layer along with network security issues.
			CO1	Work with the ETL and Mining tools.
		DATA	CO2	Demonstrate the classification, clustering techniques on the data sets.
8	BEC64	WAREHOUSING AND DATA MINING LAB	CO3	Comprehend the results obtained in the clustering, Association and Classification techniques applied on the data sets with varied input parameters.
			CO4	Ability to apply mining techniques for realistic data.
8	BEC65	COMPUTER NETWORKS LAB	CO1	Implement and analyze framing methods of the data link layer.
			CO2	Implement and analyze framing methods of the data link layer.
			CO3	Illustrate and implement error detection & correction techniques.
			CO4	Implement different Routing Algorithms.
			CO5	Understand basic Network Commands.
			CO6	Use of Wireshark and NS-2 tools.
8	BFC65	INFORMATION SECURITY LAB	CO1	Understanding of Symmetric Encryption Algorithms, Asymmetric Encryption Algorithms, Hash and Key Exchange, Digital Signature and Digital Envelope, Demonstration of NS3 Tool.
			CO1	Demonstrate a breadth of knowledge in Intellectual property.
		INTELL FOTUAL	CO2	Overview of Patents, Searching, filling and drafting of Patents.
8EC4	SEC49	EC49 INTELLECTUAL PROPERTY RIGHTS	CO3	Overview of copyright & GI.
			CO4	Overview of Trade Mark & Trade Secret,
			CO5	Overview of Integrated Circuit and Industrial Design.
			CO6	Knowledge about different national and international: Conventions and Treaties Governing

				the IPRs.
				Use the concepts learned in the courses, so far, in
			CO1	conceptualizing, designing and executing the modules of the projects.
	8E491		CO2	Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
		INTERNSHIP-I	CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
			CO4	Improve their communicative skills and team skills.
			CO1	Gain knowledge on the stages of Startup and the turbulence environment it undergoes and the stages related to growth of the Startup.
III-II &	8ZC23	ADVANCED ENTREPRENEURSHIP	CO2	Exposed to the various business models and critically evaluating the effectiveness of the business models and products.
A20			CO3	Understand the method of business traction, create roles and build their A- team.
			CO4	Understand the various channels of revenue building and exploration of new revenue avenues.
			CO5	Understand the need of sales planning and people plan and also financial modeling.
			CO6	Exposed to the legal implications affecting the company's prospects and identifying right mentors and advisors to support startups.
			CO1	Outline knowledge relating to the Indian Constitution and the Preamble to the Constitution.
			CO2	Relate to the fundamental rights and duties of the Indian citizens and the directive principles of state policy.
	8ZC26	BASICS OF POLITY AND ECOLOGY	CO3	Identify about the federal structure and judiciary of India.
		AND ECOLOGI	CO4	Understand knowledge relating to the conservation of the environment.
			CO5	Analyse about bio-diversity and climatic changes occurring in the environment.
			CO6	Discuss about the international treaties, conventions and organizations active in the field of environmental protection.
			CO1	Students will understand the nature of Entrepreneurship and its importance.
			CO2	Will gain knowledge regarding project, its life

				cycle and organization.
				Will gain knowledge relating to project formulation
87	ZC19	ENTREPRENEURSHIP	CO3	and implementation.
		PROJECT	CO4	Comprehend the components of structured finance.
		MANAGEMENTAND	CO5	Establish a framework of CMBS.
		STRUCTURED FINANCE		Students will gain knowledge relating to the CRE
		FINANCE	CO6	Servicing.
		PRINCIPLES OF OPERATIONS	CO1	Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.
8B	BC52	RESEARCH	CO2	Recognize and Solve the problem of transportation involving a large number of shipping routes with least transportation cost and generate optimal assignment strategy for different situations.
			CO3	Use Johnson's rule to create the optimal sequencing schedule for a sequencing problem and make decisions about replacing an item using replacement policy.
			CO4	Analyze the performance measures of Queing system and Calculate the EOQ for minimizing the total inventory cost.
			CO5	Apply simulation techniques for solving various types of problems and general idea development about Markov chains.
			C01	Understand the principle of operation of different types of instruments viz., PMMC, moving iron type of instruments, the required characteristics of an instrument in general. The student demonstrates the ability to compensate for the errors in the instruments and to extend the range of the instruments.
84	FUNDAMENTALS OF MEASUREMENTS AND8AC44INSTRUMENTATION	CO2	Demonstrates the knowledge of Potential and Current transformers; the errors in them and the effect of having an open/short in the secondary circuits; Understand the principle of operation of Dynamometer and Moving-iron type of Power factor meters.	
			CO3	Understand the principle of operation of dynamometer type of Wattmeter and Induction type of Energy meter; use the wattmeter to measure the Active and Reactive power and demonstrates the ability to extend the range of them.
			CO4	Identify and use different techniques of measurement of Resistance, Inductance and Capacitance values.

		CO5	Understand the principle of operation of Different type of digital voltmeters, wave analyzers, spectrum analyzers and Cathode ray Oscilloscope.
		CO6	Demonstrates the ability in characterizing the different types of transducers and uses them to measure Strain, Gauge Sensitivity, Displacement, Velocity, Acceleration, Force, Torque and Temperature.
8DC43 INTRODUCTION TO	CO1	Identify the working principle of diffusion, ion implantation, metallization and other basic components.	
	VLSI DESIGN	CO2	Comprehend basic electrical properties of various types of mos transistors.
		CO3	Identify the significance of cmos logic gates and design the multiplexers.
		CO4	Draw layouts for a cmos circuit and logic design and validate them.
		CO5	Differentiate the various types of memories and clocking strategies.
		CO6	Design various combinational and sequential circuits.
		CO1	Understand the inputs required for human centric design thinking the students learn the techniques of idea generation.
		CO2	Explore the different phases of Ideation process.
8ZC09	9 CO – CREATION AND PRODUCT DESIGN	CO3	Outline emerging technologies and understand 3d printing in manufacturing.
		CO4	Indicate developments of prototypes.
		CO5	Understand reverse engineering methods in product development.
		CO6	Review the information on IPR, and patent application.
		CO1	Appraise networking and Internet concepts and be familiar with OSI Model and TCP/IP model.
		CO2	Detect networking errors learn correction techniques.
8EC12	ADVANCED COMPUTER	CO3	Infer the role of protocols in networking and to analyze the services and features of the various layers in the protocol stack.
	NETWORKS	CO4	Differentiate Internet addressing IPv4 and IPv6 and Internet protocols.
		CO5	Conceptualize wireless networking and to Develop new protocols in networking.
		CO6	Design new virtual private networks.
		CO1	Outline Forensic science and Digital Forensic concepts.

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			CO2	Comprehend the technical concepts involved in
			002	understanding the digital forensics.
			CO3	Interpret the cyber pieces of evidence, Digital
		DIGUELI	005	forensic process model.
	8EC22	DIGITAL	CO4	Familiarize the computer operating system
		FORENSICS	04	concepts involved in digital forensics.
			CO5	Determine the legal aspects of Digital Forensics.
				Demonstrate various forensic tools to investigate
			CO6	the cyber crime and to identify the digital pieces of
				evidence.
			001	Explain primitives of Project Planning and
			CO1	evolution of software economics.
				Describe software economics; reduce Software
				product size, improvement in software
			CO2	processes, improving team effectiveness,
				improving automation, Achieving quality.
				Explain Life cycle phases and Artifacts of the
			CO3	process.
	8FC13	SOFTWARE		Describe Model based software architectures and
		PROJECT MANAGEMENT	CO4	Work Flows.
		MANAGEMENI		Apply Checkpoints for a process such as Major
				mile stones, Minor Milestones and apply work
			CO5	breakdown structures for a iterative process within
			0.05	cost and schedule. Describe Project Organizations
				and Responsibilities.
				Describe Automation and Project Control and
				Process instrumentation and explain Future
			CO6	Software Project Management such as Modern
			000	Project Profiles and Next generation project
				management.
			CO1	Understand the fundamental concepts of ML and
				Designing a Learning System.
			CO2	Understand the basic concepts of MLP, RBF and SVM and their applications
				SVM and their applications.
				Understand the Probability models namely
	8EC17	MACHINE LEARNING	CO3	supervised, unsupervised, basic statistics analyze
				their analysis of algorithms along with their
				applications.
			COA	Understand various Dimensionality Reduction
			CO4	Techniques and Apply various Evolutionary
				Algorithms with models.
			CO5	Understand the Graphical models and their
				applications.
			CO6	Understanding Analytical Learning and Analyze
				KBANN Algorithm.
			CO1	Analyze general terminology of image processing.

		CO2	Examine various types of images, intensity transformations and spatial filtering.
8FC1	8 IMAGE PROCESSING	CO3	Develop Fourier transform for image processing in frequency domain.
		CO4	Evaluate the methodologies for image segmentation, restoration etc.
		CO5	Implement image process and analysis algorithms.
		CO6	Apply image processing algorithms in practical applications.
		CO1	Introducing .Net Architecture and learn basic programming in C# and the object oriented programming concepts.
		CO2	Explain advance features and enhance skills in writing windows applications, ADO.NET and ASP.NET.
8FC2	6 C# AND .NET FRAMEWORK	CO3	Discuss various class libraries for different applications and data manipulation functions.
		CO4	Understand the advanced concepts in data connectivity, WPF, WCF and WWF with C# and .NET 4.5.
		CO5	Develop distributed applications using .NET Framework.
		CO6	Create mobile applications using .NET compact Framework.
		CO1	Design the finite automata different Languages.
		CO2	Construct finite Automata for a given regular expressions, and derive strings with suitable examples. Conceptualize context free grammars and normal forms.
8FC0	7 AUTOMATA THEORY AND COMPILER	CO3	Design the push down automata and Turing Machine for complex languages.
	DESIGN	CO4	Understand LEX tool and relate parsing techniques.
		CO5	Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (O), LR(1), LR(K) grammar and use YACC tool.
		CO6	Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form.
		CO1	Understand the functional architecture of an Operating System with usage of system calls.
8EC0		CO2	Analyze various process scheduling algorithms & pragmatics of scheduling algorithms used by various Operating Systems.
	SYSTEMS	CO3	Solve issues related to process synchronization and Deadlocks in the Operating System.

		CO4	Illustrate the concepts of Memory Management.
		04	Outline the directory structure & analyze disk
		CO5	scheduling algorithms.
		CO6	Summarize the aspects of Protection and Security, and understand the concepts of I/O systems.
		CO1	Demonstrate the use of HTML tags. Apply Styles
		CO2	using CSS and Bootstrap. Develop dynamic programs using Javascript and
			Typescript. Develop scripts using XML and validate using
		CO3 CO4	parsers. Design a data-interchange format using JSON.
		04	<u> </u>
8EC07	WEB TECHNOLOGIES	CO5	Appraise the Expressions, Filters, Directives, Controller, and Modules of Angular.
		CO6	Design responsive web applications with Forms, Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.
		CO7	Comprehend the uses of Web servers and design
		CO8	the server-side scripts using Servlets. Design and develop server-side scripts and
			components using PHP.
		CO1	Familiarize the cryptographic procedures and Understand its primitives.
		CO2	Outline Security policy in Legislation and Comprehend E-Commerce. frame work, models and its associated threats.
	CYBER SECURITY	CO3	Justify the role of electronic signatures in E- Commerce and summarize the various laws relating to it.
8FC08	AND CYBER LAWS	CO4	Categorize international cyber laws and cyber crimes.
		CO5	Explore Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000.
		CO6	Classify and Outline the offences under the Cyberspace law and the Internet in India.
8FC66	COMPILER DESIGN LAB	CO1	Implementation of DFA for a given Languages/ Regular Expression.
		CO2	Usage LEX of tool to implement lexical analyzer in compiler design and implementation of Top-Down Parser.
		CO3	Usage of YACC tools for implementing bottom up parser.
8EC66	OPERATING SYSTEMS LAB	CO1	Implement scheduling algorithms, Deadlocks, File allocation and Memory management techniques.
		CO1	Understand the basic fundamentals of computer vision and diversity of computer vision

				applications.
				Explore the various camera models, multi view
			CO2	geometry, structures and generate 3D model from
				images.
			<b>CO</b> 2	Analyze and apply image preprocessing,
8	FC19	COMPUTER VISION	CO3	continuous and discrete representation methods and
				feature extraction techniques.
				Apply regularization theory, optical
			<b>CO4</b>	communication, stereo vision, and motion
				estimation techniques to detect moving objects in a
				video.
				Illustrate different image shape representations and
			CO5	understand Fourier and wavelet descriptors and
				segmentation methods.
			CO6	Understand various object recognition methods,
				Hough transforms and illustrate shape matching.
				Demonstrate the use of HTML tags and be able to
			CO1	design web pages.Develop dynamic programs
			CO1	involving Java scripts, popup windows in
				JavaScript along Event Handling.
				Develop scripts using XML and XSLT and read
			CO2	XML documents using parsers, DOM parser, and
				SAX parser. Develop JSON files and access them
				via HTML pages.
81		WEB		Implement Angular with Expressions, Filters,
		TECHNOLOGIES LAB	CO3	Directives, Controller, and Modules.
				Develop a Single Page Application with
			CO4	implementation of Scope and Form.
				Implement Java servlets using Apache Tomcat
			CO5	Server for User authentications.
				Develop an application in PHP with Database
			CO6	connectivity
				Use the concepts learned in the courses, so far, in
			CO1	conceptualizing, designing and executing the
				modules of the projects.
				Exhibit the interest in learning the modern tools
				and technologies through the bridge courses
			CO2	
				arranged in the college, beyond the curriculum, and
				hence developing the software.
8	8E694 GROUP PROJECT	CO3	Inculcate an enthusiasm to use the creative ideas to	
		CO3	build the innovative projects which are meeting the	
			current needs of the market and society as a whole.	
			CO4	Improve their communicative skills and team skills
			largely improve.	
			CO5	Work as an individual and in a team.

	01-(01	COMPDEILENGUVE	CO1	Assessed the larger ledge of the state of th
	8E681	COMPREHENSIVE VIVA VOCE	C01	Assessed the knowledge of the students in the Core
		VIVA VOCE		and Elective subjects that they have studied till the
				completion of that academic year.
	8E692	SUMMER		
		INDUSTRY		
		INTERNSHIP-II		
				Comprehend the various access control rules
			C01	available to assign privileges and protect data in
				databases.
			C02	Describe and compare the popular Security
			C02	Models.
			<b>C03</b>	
1	7EC13	DATABASE	C03	Categorize the security mechanisms and their
		SECURITY		functions.
			CO4	Identify the Security Software Design principles to
				protect data in databases.
			CO5	Classify and compare the Statistical Database
				Protection & Intrusion Detection Systems.
			CO6	Learn the new models of database systems and the
				models of protection.
			C01	Explain need, practices and Risk issues in Software
				requirements.
		SOFTWARE	C02	Describe Software Requirements Engineering
	7FC11	REQUIREMENTS		elements such as review, quality and priorities.
		AND ESTIMATION	C03	Explain software Modeling and Requirements
IV-I & A18				Management.
			CO4	Apply Estimation methods for size using Mark II
				FPA, Full Function Points, LOC Estimation.
				Apply Cost and Schedule estimation factors during
			C05	software development.
				Apply tools for Requirements Management and
			CO6	Estimation.
			C01	Discuss the importance of big data.
				Interpret the challenges with big data; elaborate the
		BIG DATA	C02	knowledge about the technological developments
			02	<b>0 1</b>
		ANALYTICS	<u>C02</u>	in big data environment.
	7EC18		C03	Assess about NOSQL data environment.
			CO4	Capability of understanding the usage of big data
				in context to cloud and other technologies.
			CO5	Justify about map reduce work flows.
			CO6	Implement Data Analysis with HADOOP and
				related tools.
		BLOCK CHAIN	C01	Understand basic principles of HDFS and digital
	76016	TECHNOLOGIES		signature.
	7FC16		COO	Learn about blockchain advantages, Simplified
			C02	Payment Verification protocol and its life cycle.
	1		1	r agment v enneation protocor and its me cycle.

			COO	Explain the Nakamoto consensus and List and
			C03	describe differences between proof-of-work and
				proof-of-stake consensus.
			CO4	Understand Bitcoin and Ethereum.
			CO5	Learn about the legal issues of Blockchain through
				some applications.
			CO6	Discuss new trends in Blockchain technologies.
			C01	Understand the Security Issues and Measures.
			C02	Know the KEY Elements and Logical Elements of
		INFORMATION SECURITY. MANAGEMENT AND STANDARDS		Networks.
			C03	Understand the Data Leakage, its Threats and
	7EC14			Mitigation.
	/2011		CO4	Understand the Database Security.
			CO5	Understand the Policies, Guideline and Framework
			005	of Information Security.
			CO6	Understand the Ethics, Roles and Responsibilities
			000	of ISM.
			C01	To understand the essence of agile development
				methods.
			C02	To apply the principles and practices of extreme
	<b>5</b> EC10	AGILE SOFTWARE DEVELOPMENT		programming in real world problems.
	7FC12		C03	To incorporate proper coding standards and
				guidelines in an agile process.
			CO4	To optimize an agile process by exploring the
				possible risks and threats in the software process.
			CO5	To improve the process by eliminating waste.
			CO6	To design an agile process for a business
				application and deal with appropriate tradeoff.
			C01	Elaborate the fundamentals of business
				intelligence.
			C02	Link data mining with business intelligence.
		BUSINESS	C03	Apply various modeling techniques.
	7EC19	INTELLIGENCE	CO4	Perform the data analysis and knowledge delivery
				stages.
			CO5	Apply business intelligence methods to various
				situations.
			CO6	Decide on appropriate technique for the given
				model.
		AUGMENTED AND VIRTUAL REALITY	C01	Understand the fundamentals of Virtual Reality.
				Comprehend multiple Models of Input and Output
	7FC17		C02	Interface in Virtual Reality like Gloves, Video-
				based Input, 3D Menus & 3DScanner etc.
	_		C03	Describe the fundamentals or Advanced topics of
			-	Computer Graphics.
			CO4	Explain the Interactive Techniques on VR in
1				respect of Body Track, Hand Gesture, 3D Manus,

		Object Grasp.
		Know about the developments Tools of VR and
	CO5	describe.
		Familiarize the Conceptual idea on Augmented
	CO6	Reality and relate the illustrations.
	C01	Describe concepts of Software testing.
	C02	Describe and apply the concepts Flow graphs, Path
		testing and Data Flow Testing.
	<b>C03</b>	Practice Software testing strategy and Environment
	C03	with economics and apply Software Metrics useful in software development and maintenance.
		Software Testing Methodology, finding defects
SOFT	WARE	hard to find, Verification and validation,
	TION AND CO4	Functional and structural, Workbench concept,
7F719 TEST	ring CO4	Eight Consideration of software testing
		methodology, checklist. Describe Agile computing
		with agile testing.
		Demonstrate Software Testing Techniques such as
	CO5	JADs, Pareto Analysis ,Regression Testing, Structured walkthroughs, Thread testing ,
		Performance testing and White box testing.
		Describe Graph matrices and applications, and
	CO6	practice and apply automated testing tools such
		load Runner, UFT and QTP.
	C01	Get familiarized with the fundamental concepts of
	CUI	security attacks, security services.
	C02	Implement the conventional cryptographic
		techniques.
INFORM	AATION C03	Simulate the Public key cryptography techniques.
7EC08 SECU	RITY CO4	Comprehend IP security Architecture and its role in security framework.
	CO5	Implement SSL and TLS for Web Security.
	CO6	Design Intrusion Detection Systems and Firewall.
7F708 LIN		Describe the basic Linux commands.
PROGRA	AMMING C02	Write Shell Scripts.
	C03	Enlist various System Calls in Linux.
	CO4	Classify various system calls to handle the
		processes and signal the process.
	CO5	Elaborate the working of IPC.
		Demonstrate the significance of Semaphores for Karmel support and simulate program using the
	CO6	Kernel support and simulate program using the
		same. Learn the distinction between optimal reasoning
	C01	
	C01	Vs human like reasoning and formulate an efficient

				language. Also select a search algorithm for a
				problem and estimate its time and space
				complexities.
			C02	Apply AI techniques to solve problems of game
		ARTIFICIAL		playing, theorem proving, and machine learning.
	7EC20	INTELLIGENCE	C03	Learn different knowledge representation
	/EC20			techniques.
				Understand the concepts of state space
			CO4	representation, exhaustive search, heuristic search
				together with the time and space complexities.
			CO5	Comprehend the applications of Probabilistic
				Reasoning and Bayesian Networks.
			CO6	Analyze Supervised Learning Vs. Learning
			<b>C01</b>	Decision Trees.
			C01	Understand cyber-attacks, types of cybercrimes.
			COO	Realize the importance of cyber security and
			C02	various forms of cyber attacks and counter
		CYBER SECURITY	<u> </u>	measures.
			C03	Get familiarity of cyber forensics.
	7FC20		CO4	Get familiar with obscenity and pornography in
	11020			cyber space and understand the violation of right of
				privacy on Internet.
			CO5	Appraise Cyber laws and also how to protect them self and ultimately the entire Internet community
				from such attacks.
			CO6	Elucidate the various chapters of the IT Act 2008,
				power of Central and State Government to make
				rules under IT Act 2008.
		SOFTWARE		Prepare Test Plan document and write Test Cases
		AUTOMATION AND		for Small scale Project (Like for their B.Tech IV
	7F778	TESTING LAB	C01	Year Project or Post-Graduate Projects), they are
	11/10			learn how to Analyze SRS document in order to
				prepare Test Plan Document.
				Demonstrate skills to use modern software testing
				tools (EX: UFT, TestLink, Bugzilla, Selenium,
			C02	Test Director and Quality Center) and test
				application (web, Window application) by using
				the tools.
				Demonstrate the ability to differentiate between
				different Testing tools present in the market (like
				functional testing tools, Test Management Tools,
			C03	Bug Tracking Tools and Performance Testing
				Tools) and prepare Test Plan document and write
				Test Cases for Small scale Project (Like for their
				B.Tech IV Year Project or Post-Graduate Projects).
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				To understand how to work with Linux commands
			C01	for handling files, processes, text utilities, backup
			001	and network utilities.
				To explore basics of building shell scripts gain
			C02	knowledge to compose various Shell Scripts.
				To learn and demonstrate the I/O functions, low-
			C03	
	<b>7F777</b>	PROGRAMMING LAB	005	level system calls System Calls available for file and directory handling.
	716777			
			CO4	To gain knowledge in implementing processes
				aspects, mastering the process APIs.
			CO5	To understand how to implement pipes, FIFO, how
				to use for communication purpose in IPC.
			~~ <	To understand the significance of Semaphores for
			CO6	Kernel support and simulate program using the
				same.
			C01	Design and Implement symmetric key encryption
				algorithms.
			C02	Simulate asymmetric key encryption algorithms.
			C03	Implement hashing and key exchange algorithms.
	7EC76	INFORMATION	CO4	Simulate and execute Digital Signature and Digital
	/EC/0	SECURITY LAB	004	envelope.
			CO5	Install and execute various projects in NS3.
			C01	Develop plans with relevant people to achieve the
			C01	project's goals.
			<b>C02</b>	Break work down into tasks and determine
	7E784	PROJECT - I	C02	handover procedures.
	/E/04		<b>C02</b>	Identify links and dependencies, and schedule to
			C03	achieve deliverables.
				Estimate the human and physical resources
			<b>CO4</b>	required, and make plans to obtain the necessary
				resources.
			CO5	Allocate roles with clear lines of responsibility and
			005	accountability with team spirit.
			000	Design and develop the software or prototype to
			CO6	meet societal needs.
				Use the concepts learned in the courses, so far, in
			C01	conceptualizing, designing and executing the
				modules of the projects.
				Exhibit the interest in learning the modern tools
			000	and technologies through the bridge courses
			C02	arranged in the college, beyond the curriculum, and
		SUMMER INDUSTRY		hence developing the software.
		INTERNSHIP-II		Inculcate an enthusiasm to use the creative ideas to
	7E682		C03	build the innovative projects which are meeting the
			_	current needs of the market and society as a whole.
	1	1	I	about of the market and society as a whole.

			COA	Improve their communicative skills and team skills
			CO4	largely improve.
			CO5	Work as an individual and in a team.
			C01	The students gain the knowledge on the inputs required for innovation and also gain familiarity on Entrepreneurship.
			C02	The students will get exposure on creative methods of ideation and the importance of protecting the ideas.
	7ZC24	INNOVATION AND DESIGN THINKING	C03	The students gain knowledge on design thinking and types of thinking.
			CO4	The students gain familiarity on emerging technologies like Internet of things (IOT).
IV-II & A18			CO5	The students understand the process of building the startup.
Alo			CO6	The students gain knowledge on various startup funding and also to branding building for the
				startup.
	7ZC27	INDIAN HISTORY, CULTURE AND	C01	To appreciate and understand our Indian History, Culture and Indian heritage.
	GEOGRAPHY	GEOGRAPHY	C02	To understand secularism of our country.
		C03	To appreciate and understand the social reformers who brought revolutionary changes in Indian society.	
		CO4	To understand earth evolution and world climatic change.	
			CO5	To understand India Oceanography, Able to enhance and understand Indian monsoons, Indian agriculture.
			C01	This unit enables the students to understand the financial structure and the financial sector reforms after 1991.
			C02	The unit gives the exposure on the role of RBI and the Regulating and credit policies adopted by the RBI.
	FINANCIAL INSTITUTIONS,	INSTITUTIONS,	C03	The students get awareness on the role of Non- Banking financial institutions and the role of financial institutions in India.
	7ZC15	MARKETS AND SERVICES	CO4	The unit educates the students to know the role of regulatory bodies like SEBI and also to know the capital and money market instruments.
			CO5	The unit equips the students to understand about the asset fund based financial services.
			CO6	The students will get exposure about the
				investment banking and merchant banking.

		C01	Understand the need for manufacturing processes
		C02	and various material properties. Understand the principle of casting, Patterns used, Pattern allowance and Gating systems used in
		C03	casting, and various casting methods. Understand the basic principle of welding and distinguish between various welding types and
7BC52	PRINCIPLES OF MANUFACTURING PROCESSES	CO4	their applications. Understand the principles of metal working, various types of metal working techniques, Knowledge of hot working and cold working, Ability to understand the bulk deformation processes of rolling.
		CO5	Understand the bulk deformation processes of extrusion and forging, their applications and forces involved in these operations.
		CO6	Understand and distinguish the various press
			working operations with respect to their
			applications, advantages and disadvantages,
			understand the various types of plastics and their processing techniques.
7AC45	FUNDAMENTALS OF		Understand the role and potential of new and
	RENEWABLE		renewable energy sources realize the potential of
	ENERGY SOURCES	C01	solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.
		C02	Demonstrates the knowledge of different techniques of solar collection and storage.
		C03	The student becomes familiar with the different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same. The student also demonstrates the knowledge of different Bio-gas digesters and factors influencing its yield.
		CO4	Aware of the potential of geothermal energy in India and will be able to characterize different types of geothermal wells.
		CO5	Aware of the different methods of kinetic energy extraction from Ocean waves and tides and thermal energy extraction from Oceans.
		CO6	Demonstrates the knowledge of Direct Energy Conversion in different phenomena viz., Joule
			Thomson effect, Seebeck effect, Peltier effect etc.

				and the principle of operation of Fuel Cells.
			C01	Analyse and Design of BJT Single stage,
				multistage amplifiers at low and high frequencies.
			C02	Analyse and Design JFET and MOSFET
				amplifiers. Design different types of Feedback Amplifier,
		ELECTRONICS	C03	Oscillators and their analysis.
	7CC44	CIRCUIT DESIGN AND ANALYSIS	CO4	Analyse and Design power amplifiers. Understand
				distortions.
			CO5	Analyse and Design tuned and RF amplifiers such as single tuned, double tuned, stagger tuned and
			005	wide band amplifier.
			CO6	Understand the stability of oscillators and tuned
				amplifiers.
			CO1	Recognize of the principles of mobile ad hoc
		MOBILE ADHOC AND		networks (MANETs) and what distinguishes them from infrastructure-based networks.
		SENSOR NETWORKS	~	Comprehend the characteristics of wireless sensor
	7EC15		C02	networks (WSNs).
			~~~	Report how proactive protocols function and their
			C03	implications on data transmission delay and
				bandwidth consumption. Assess how reactive routing protocols function and
			CO4	their implications on data transmission delay and
				bandwidth consumption.
			CO5	Analyze the functioning of proactive routing protocols and their implications on data
			005	transmission delay and bandwidth consumption.
			CO6	Analyze the functioning of reactive routing
				protocols and their implications on data
				transmission delay and bandwidth consumption. And become familiar with the mechanisms for
				implementing security and trust mechanisms in
				MANETs and WSNs.
			CO1	Understand the issues affecting the organization,
				planning, and development of large and complex software systems.
			C02	Understand the concepts of software metrics and
		ADVANCED	C02	reuse-based software engineering.
	7FC13	SOFTWARE ENGINEERING	C03	Apply software engineering principles in the
			~ ~ .	development of distributed software systems. Design and implement service-oriented software
			CO4	systems.
			CO5	Understand the design and development of aspect-
				oriented software systems.
			CO6	Understand software re-engineering process model.

			C01	Describe the characteristics of aloud
				Describe the characteristics of cloud.
		C02	Describe the cloud services.	
			<b>C02</b>	Understand different architectures for cloud
			C03	applications, Creation and running of python
	7EC21	CLOUD		programs, running amazon ec2 instance
		COMPUTING		Understand Data Intensive applications and future
			CO4	trends of Internet Clouds supporting Mobile Computing, Ubiquitious Computing and Social
				Networking.
				Discuss mapreduce and image processing app on
			CO5	cloud.
			CO6	Discuss cloud security architecture.
			CO1	Get familiar with terminology, technology and
				applications of IoT.
				Understand and explain IoT system management
	7DC55	INTERNET OF	C02	using M2M (machine to machine) with necessary
	THINGS	002	protocols.	
		C03	Design and develop Python Scripting Language	
			programs preferred for many IoT applications.	
			CO4	Use Raspberry PI as a hardware platform for
				designing the IoT sensor interfacing.
			CO5	Implement web based services for IoT.
		CO6	Understand and analyze the case studies	
				illustrating IoT Design.
			CO1	Develop plans with relevant people to achieve the
				project's goals.
			C02	Break work down into tasks and determine
				handover procedures.
			C03	Identify links and dependencies, and schedule to
	7E885	<b>PROJECT - II</b>		achieve deliverables.
	12005			Estimate the human and physical resources
			CO4	required, and make plans to obtain the necessary
			resources.	
			CO5	Allocate roles with clear lines of responsibility and
		CO6	accountability with team spirit. Design and develop the software or prototype	
			using modern software tools wherever applicable	
				to meet societal needs.



# Course Outcomes of ECM Department

SREENIDHI INSTITUTE OF



### SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

### Department of Electronics and computer Engineering COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and regulation	Course code	Course name	Co's	
			COI	Explain semiconductor behaviour, types and their applications
			CO2	Differentiate the wave and particle, and its application for a particle in one dimension box
	0110303	Engineering	CO3	Explain about emission, its types, laser principle and applications of optical fibers (sensors and medical endoscopy)
	9HC07	Physics	C04	Reveals about the magnetism-its origin and types and its applications
			C05	Explain the basic concepts of dielectric materials, polarization and its types, their applications (piezo, ferro and Pyro electricity).
			C06	Summarize nanc& bulk concepts, surface to volume ratio and its applications.
			C01	Explain basic fundamentals of Computer Systems , computing environments , Computer Languages – Machine Languages
	9FC01	Problem Solving using C	CO2	Describe C language Programs, Structure of a C Program
			CO3	Describe write programs using control structures such as Pre-test and post-test loops, while, do while, for, break
			CO4	Write programs implementing application on arrays
			CO5	Write programs using Pointers and string handling functions
			C06	Write programs using Enumerated, Structure, Union types and files.
I-I & A22	9HC11	MATRIX ALGEBRA AND CALCULUS	CO1	Basic operation of matrices and about the linear system and some analytical methods for solution.
			CO2	Concept of Eigen value and Eigen vector and their properties and applications.
			CO3	Quadratic form and its properties.
			CO4	Mean value theorems and their applications to the given functions, series expansions of a function.
			C05	Various analytical methods to solve first order first degree and also the equations not of first degree ordinary differential equations.
			CO6	Methods to solve higher order ordinary differential equations.
		Essential English	CO1	Demonstrate competence with suitable accuracy in vocabulary, and language fluency.
		Language Skills	CO2	State the definition of nouns, verbs, adjectives, and adverbs.
	9HC01	(EELS)	CO3	Identify the differences of each tense and use the tenses accurately.
	SHCOL		C04	Identify specialized reading strategies for specific types of texts
			CO5	Produce written work that is substantive, organized, and grammetically accurate.
			C06	
	9BC01		CO1	Get familiar to use the instruments to solve the engineering problem and draw various type of curves

		Engineering		used in engineering
		Graphics		Understand and Implement Orthographic projections
		Graphics	CO2	and draw projections of simple drawing entities such as
			002	points Lines, and Planes
		-		
			CO3	Draw projections of different types of regular solids in
				various positions wrt principal planes of projection
			004	Draw Sections of various Solids including Cylinders,
			CO4	cones, prisms and pyramids and draw the developments
				of these solids and their sections.
			CO5	Construct Isometric Scale, Isometric Projections and
				Views and convert 3D views to 2D orthographic views
				Understand from basic sketching through 2D and 3-D
			CO6	solid modeling using computer aided design (CAD)
				software
			CO1	Describe people, objects and situations using simple
		Oral	001	sentences.
		Communication	CO2	Use appropriate tenses and expressions in different contexts
		Lab-I		of conversations.
	9HC61		CO3	Identify major areas of concern in their oral communication and address them.
				Create a SMART plan to enhance their communication skills
			CO4	in English
			CO5	
		-	CO6	
			001	Demonstrate the wave length of monochromatic source of
			CO1	light by using Newton's Rings
	Engineering Physics Lab 9HC66	Engineering	CO2	Analyze refractive index of a material prism and Dispersive
				power of a glass Prism by using spectrometer
		CO3	Determine the wave length of spectral light and laser Source	
			COS	of light by using Diffraction Grating
			CO4	Design and Analyze RC Circuits
			CO5	Analyze RLC Series circuit and parallel circuit
			CO6	Investigate magnetic Circuits
			CO1	To formulate the algorithms for simple problems
			CO2	To translate given algorithms to a working and correct
		Problem Solving	202	program
		using C Lab	CO3	To be able to correct syntax errors as reported by the
	9FC61		compilers	
		CO4	To be able to identify and correct logical errors encountered	
		-	CO5	at run time
				To be able to write iterative as well as recursive programs To be able to represent data in arrays, string manipulation
			CO6	through a program
<b>-</b>	1		a	<i>To be able to create, read and write to and from simple text</i>
			CO7	files.
				<i>j</i>

## 1.1.1 COs for A22 Regulation Ist Year, IInd Semester courses/subjects

Year and	Course	Course name	Co's	
regulation	code		CO1	
			CO1 CO2	Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.
			CO3	<i>Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.</i>
	9HC04	Engineering Chemistry	CO4	Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
			CO5	Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
			CO6	Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques
			CO1	Design the programs using structures, unions and enum.
	9EC01		CO2	Demonstrate the concepts of Abstract data type and also applications of stacks and queues.
		Data Structures	CO3	Implement basic operations on single, double and circular linked list.
			CO4	Solve problems involving Binary Search trees and AVL trees.
			CO5	Articulate the concepts of graphs, heaps and hashing.
			CO6	Develop algorithms for various searching and sorting techniques and analyze their performance.
I-II & A22			CO1	Find the limits and test for the continuity and differentiability of a function.
			CO2	Solve the problems on multiple integrals.
		Advanced Calculus	CO3	Solve linear and nonlinear first order partial differential equations.
	9HC12		CO4	Find Series expansion a function defined over the intervals.
			CO5	<i>Find directional derivative, gradient, divergence and curl of a function.</i>
			CO6	Solve problems of line, surface and volume integrals.
			CO1	Understand the principle of different methods of electrical circuit reduction.
		Electric Circuits	CO2	Understand the principle of single phase A.C circuits.
	9AC42		CO3	Understand the principle of magnetic circuits.
	771042	and Networks Analysis	CO4	Understand the principles of network theorems along with its applications.
			CO5	Understand the principle two port networks along with its applications.

r				
			CO6	<i>Understand the principle of transients with both DC and AC excitation</i>
			CO1	Understand the nuances of striking a great conversation in formal and informal situations.
	9HC62	Oral Communication	CO2	Gain experience of facing an audience and speaking in public.
		Lab – II	CO3	Design a winning presentation and present it with ease
			CO4	
			CO5	
			CO6	
			CO1	Preparation of Inorganic compounds
			CO2	Determination surface tension of a liquid
			CO3	Determination viscosity of lubricant
			CO4	Determination acid value of an oil
			CO5	Estimation hardness of water
			CO6	Analysis the amount of chloride content
	9HC64	Engineering Chemistry Lab	C07	Determination of cell constant and conductance of solutions
			CO8	Determination of redox potential and emf of solutions
			C9	Determination of the rate constant of acid
			CO10	Synthesis of a polymer (Thiakol rubber / Urea- Farmaldehyde resin)
			CO11	Synthesis of a drug- Aspirin
			CO12	Estimation of Mn <sup>+7</sup> by Colorimetry method
			CO1	Write programs on structures and unions.
			CO2	Implement Stacks, Queues and circular queues using arrays.
		Data Structures	CO3	Write programs to implement basic operations on various types of linked list.
	9EC61	using C Lab	CO4	Implement insertion and traversal operations on binary search tree
			CO5	Develop programs on various searching, sorting algorithms.
		ļ	CO6	
			CO1	Use various types of conventional manufacturing Processes
			CO2	Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience
	9BC61	Workshop/Manu facturing	CO3	Manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.
	Processes Lab		CO4	Produce small devices / products /appliances by assembling different components
		CO5		
		CO6		

### 1.1.1 Template for COs for A20-IIst Year, I Semester courses/subjects-ECM

Year and regulation	Course code	Course name	Co's			
1 cgulation	couc		CO1	Describe Connectives, Normal Forms and Theory of Inference with suitable examples.		
			CO2	Solve problems with Predicate Calculus and generate inferences.		
		Discrete Structure	CO3	Solve and explain Relations and Ordering problems and solve problems of Lattices.		
	8D301	and Graph Theory	CO4	Distinguish algebraic systems like semi-groups, monoids and groups and apply concepts of Combinatorics for solving problems		
			CO5	Solve problems with recurrence relations.		
			CO6	Explain and apply concepts of Euler's Formula, Multigraphs, Euler's Circuits, Hamiltonian graph and Chromatic Numbers for solving problems.		
			CO1	Gains exposure towards Python versions and their specifications		
		Python and Shell	CO2	Build programs using primitive data types and write applications that include functions, modules, packages along with respective exceptional handling mechanism		
	8D309	Programming	CO3	Writes applications using OO features of Python and also handle files		
			CO4	Understand and use the commands for text process, files management in the real time environment		
			CO5	Develop the commands for data management		
			CO6	Write shell scripts for the real time applications		
II-I & A20	8CC01	Electronic Devices and Circuits	CO1	Demonstrate the concepts of pn Diode, Zener Diode, Bipolar Junction Transistor, Field Effect Transistor and their characteristics.		
			CO2	Design and Analyze the Amplifier circuits using BJT and FET.		
			CO3	Classify and characterize the Feed Back amplifiers and design various Oscillator circuits.		
			CO4	Understand the Basic regulator circuits and voltage multipliers.		
			CO5			
		Digital Logia	CO6 CO1	An ability to understand number systems and apply the rules of Boolean algebra and K-maps to simplify Boolean expressions.		
	0.000	Digital Logic Design	CO2	An ability to design MSI combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters.		
	8CC02		CO3	An ability to design basic memory units (latches and flip- flops) and sequential circuits such as counters and registers		
			CO4	An ability to design digital design using PLD's such as ROM's, PLA's, PALs and digital controllers using Algorithmic State Machine Charts.		
	8CC03		CO1	Understand the concepts of signals, comparison of signals, orthogonal signal space and Apply the orthogonality properties to understand the Fourier methods of signal		

		Signals and		analysis- Fouries series and Fourier Transforms.
		Systems		Understand the concepts of systems, their characterization
		bystems		in the Time as well as Transformed domains and apply the
			CO2	mathematical tools, such as Convolution, Correlation and
				the Laplace transform to analyze signals and systems.
				Determine the sampling frequency for any low pass and
			CO3	
				band pass signals applying the sampling theorem.
			~~ .	Distinguish between continuous and Discrete time signals
			CO4	and systems. Apply the concepts of Z-Transforms in the
				analysis of DT signals and systems.
			CO1	Apply process models in real world software products.
		Software	CO2	Classify software requirement specification document.
	9D210	Engineering	CO3	Design system models and user interface.
	8D310	0 0	CO4	Evaluate test strategies for various softwares.
			CO5	Describe product metrics, risks.
			CO6	Understand the quality management.
			000	To understand the basics of Managerial Economics at Micro
			CO1	level
		Economics,	CO2	To understand cost concept
		Accountancy and		To understand and identify various basic concepts of
	8ZC01	Management	CO3	Accounting
		Science	CO4	To understand the concepts of Capital expenditure
		Science	CO4	
			CO5	To make student understand the basics of Management
			CO6	To make student learn about various personality traits
			CO1	Understand about ecosystem and energy flow among the
			001	organisms.
	Environmental Science and	CO2	Know the resources available, use of them and	
		Science and	02	overexploitation of the resources in the nature.
	8HC05	Ecology	CO3	Learn the value, use and value of biodiversity.
	опсоз		004	Understand the causes and effect of pollution and implement
			CO4	measures in control of pollution.
				Understand the sustainable development and implement
			CO5	green technology for sustainable development.
			CO6	<i>Learn and implement policy to protect the environment.</i>
			C01	Install and run the Python interpreter
			CO1	Apply the best features of mathematics
	8D361	Python and Shell	CO2 CO3	Describe the Numbers
	80301	Programming Lab	005	
			CO4	Understand and summarize different File handling operations
		Electronic Devices		Understand color coding, operations on Diode, BJT, FET
		and Circuits Lab	CO1	and other electronic components.
				A
			CO2	1 1
	90071			implementation.
	8CC71		001	Apply the knowledge of Diodes, Capacitors and Transistors
			CO3	for the realization of rectifiers, regulators, amplifiers and
				Oscillator circuits.
			CO4	Adapt effective Communication, presentation and report
		Commohensier		writing skills
		Comprehensive Test and Viva	CO1	Comprehend the concepts in the Core Courses of 1 <sup>st</sup>
				year 1 <sup>st</sup> Semester
	8D385	Voce- III	CO2	Assess technical knowledge to face interviews.
		[2 Mids (Viva) and		Exhibit lifelong learning skills to pursue higher studies
		End Semester	CO3	or professional practice.
		(Test and Viva) =		r Jan r

	30+70]		
		CO1	<i>Identify current general, political and technology related topics.</i>
	Technical Seminar	CO2	Arrange and presentseminar in a effective manner
8D393	– III	CO3	Collect, survey and organize content in presentablemanner
		CO4	Demonstrateoratoryskills with the aid of Power Point Presentations
		CO5	Exhibit interview facingskillsand teamleadingqualities

## 1.1.1 Template for COs for A20-II Year, II Semester courses/subjects

Year and	Course	Course name	Co's	
regulation	code			
			CO1	Solve the random variable problems and probability distributions.
			CO2	Estimate the parameters and solve the problems using central limit theorem.
		Probability and	CO3	<i>Test the hypothesis related to samples concerning to the means and proportions of large size samples.</i>
	8HC16	Statistics	CO4	Apply and solve the problems using t-test, Chi-square test also testing the hypothesis problems on small size samples, goodness of fit and independence of attributes.
			CO5	Solve the problems on measures of central tendency, Correlation and regression models
			CO6	
			CO1	Describe fundamentals of JAVA, its Classes, and Objects and write simple programs using constructors.
			CO2	Explain and write programs using inheritance, interface and packages.
	Object Oriented	CO3	Explain and write programs using Packages, I/O Stream and collections.	
	8EC02	Programming	CO4	Describe and write programs to implement Exception handling and Multithreading.
		through Java	CO5	Describe and write programs using AWT, Swings and develop applications using event handling.
			CO6	Describe and develop applications using Applets and develop client server programs using networkingconcepts.
			CO1	Basicstructureofadigitalcomputer
		Computer	CO2	Arithmeticoperationsofbinarynumbersystem
	8D403	Organization and	CO3	Theorganization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
П-П &		Operating	CO4	Operatingsystemfunctions, types, system calls.
A20		Systems	CO5	Memorymanagement techniquesanddead lockavoidance
			CO6	Operatingsystemsfile systemimplementationanditsinterface
		Database Management	CO1	Comprehend importance, significance, models, Database languages, architecture and design of Data BaseSystems.
	8EC03	Systems	CO2	Design Relational Models and apply Integrity Constraints, Querying fundamentals, Logical data base Design and Views of databases along with application of Relational Algebra.
	0ECU3		CO3	Apply queries in SQL Query using Nested Queries Set, Comparison Operators, Aggregative Operators, Logical connectivity's with Joins statements and develop applications.
			CO4	Eliminate data redundancy through normalforms.
			CO5	Ensure ACID properties and Serializability in Transaction management and

				Database Recovery.
			<u> </u>	Use different External Storage Organization techniques and apply Indexing
			CO6	in databases to enhance systemperformance.
		Analog and	CO1	Distinguish between small and large signal amplifiers.
		Pulse Circuits	CO2	Analyze and Design tuned and RF amplifiers.
		i uno chiculto	CO3	Understand linear and non-linear wave shapingmethods.
	8D414			Understand analyze and design various types of multivibrators, their
	02.11		CO4	analysis, designing and applications
			CO5	<i>Explain different sweep generators and their applications.</i>
			CO6	Analyze various types of Logic gates and Sampling gates.
		Soft Skills	CO1	Assess themselves using SWOT analysis.
		~~~~~~	CO2	Appraise the importance of certain soft skills like time management and goal setting.
			CO3	Improve their verbal ability to handle the competitive exams.
				Enhance their team skills and design thinking capabilities for effective problem
	8HC03		CO4	solving and decision making.
			CO5	Know their emotional quotient which guides their thinking, behavior and helps the
			005	manage stress efficiently.
			CO6	Equip themselves with the prerequisites, and relevant techniques to effectively attend
				corporate interviews
		Universal	CO1	Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
	8HC17	Human Values		Understanding (or developing clarity) of the harmony in the human being, family,
	011017		CO2	society and nature/existence
			CO3	Strengthening of self-reflection.
			CO4	Development of commitment and courage to act.
		Soft Skills Lab	CO1	Assess themselves using SWOT analysis.
			CO2	Appraise the importance of certain soft skills like time management and goal setting.
			CO3	Improve their verbal ability to handle the competitive exams.
	8HC63		CO4	Enhance their team skills and design thinking capabilities for effective proble solving and decision making.
			CO5	Know their emotional quotient which guides their thinking, behavior and helps themmanage stress efficiently.
			CO6	Equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews.
				To understand the design and working of various linear and non-linear
			CO1	wave shaping circuits.
		Analog and	CO2	To demonstrate the working principle of various multivibrators.
	8D463	Pulse Circuits	CO3	To verify the functionalities of various logic gates.
	02 100	Lab		To perform and verify the BJT/ FET and feedback amplifiers.
			C04	To perform and verify the working of oscillators and voltage regulators.
				To perform laboratory experiment to verify the conversion efficiency of
			CO6	various power amplifiers
		Database Management	CO1	Create tables for a database and apply Queries using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.
		Systems Lab	CO2	Write Queries using Aggregate functions such as [COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING], Conversion functions and use string
				functions for a given application.
	8EC63		CO3	Explain and write programs using PL/SQL programs using exceptions,
			CO4	COMMIT, ROLLBACK and SAVEPOINT in PL/SQLblock. Develop programs using WHILE LOOPS, FOR LOOPS, nested loops using
			CO5	BUILT–IN Exceptions and writeProcedures. Write Programs for stored functions invoke functions in SQL Statement and
			C05	write Programs for packagesspecification. Describe and write programs using features of CURSORs and itsvariables.
	8EC62	Object	C00	
	orco2	Object		Write programs to generate Prime numbers, Roots of quadratic equation

	Oriented Programming through Java Lab	CO2 CO3 CO4 CO5 CO6 CO7	and Fibonacciseries.         Write small application such as bankingsystem.         Write programs on operator, function overloading and dynamic methoddispatch.         Write programs to implement interface andpackages.         Explain and write programs to implementthreads.         Write programs to implement applets and eventhandling.         Write an application to implement client and serverscenario
8D486	Comprehensive Test and Viva Voce- IV [2 Mids (Viva) and End Semester (Test and Viva) = 30+70]	CO1 CO2 CO3	Comprehend the concepts in the Core Courses of 1 <sup>st</sup> year 1 <sup>st</sup> Semester Assess technical knowledge to face interviews. Exhibit lifelong learning skills to pursue higher studies or professional practice.
8D494	Technical Seminar - IV	CO1 CO2 CO3 CO4 CO5 CO6	Identifycurrentgeneral, political and technologyrelated topics.Arrange and presentseminar in a effective mannerCollect, survey and organize content in presentablemannerDemonstrateoratoryskillswith the aidof Power Point PresentationsExhibit interview facingskillsand teamleadingqualities

# 1.1.1 Template for COs for A20-III Year, I Semester courses/subjects

Year and regulation	Course code	Course name	Co's	
			CO1	Analyze worst-case running times of algorithms using asymptotic analysis.
			CO2	Synthesize divide and-conquer algorithms. Derive and solve recurrences describing the performance of divide- and-conquer algorithms.
	8FC05	Design and Analysis of Algorithms	CO3	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
			CO4	Comprehend the concept of dynamic programming algorithms, their applications and analyze them.
			CO5	Analyze the Backtracking and Branch and Bound algorithms and also identify the scenarios for its applicability.
			CO6	Comprehend the concept of P and NP Problems and its usage in the applications.
	80006	Analog and Digital	CO1	Analyze and design of various continuous wave and angle modulation and demodulation techniques
	8CC06	Communications	CO2	Understand the effect of noise present in continuous wave and angle modulation techniques.
			CO3	Attain the knowledge about AM, FM Transmitters and

				Receivers
				Analyze and design the various Pulse Modulation
			CO4	Techniques.
III-I & A20				Understand the concepts of Digital Modulation
111-1 & A20			CO5	Techniques and Baseband transmission, source coding
				and channel coding.
			CO6	Analyze and design of various continuous wave and angle
			000	modulation and demodulation techniques
			CO1	Demonstrate the concepts of Differential Amplifier and
				Operational Amplifier and their characteristics.
			CO2	Design the basic circuits using IC 741 op-amp.
			000	Explore, design and analyze active filters, timers,
	8CC07	IC Applications	CO3	oscillators, voltage controlled oscillator DACs and ADCs,
				and IC regulators. Classify and characterize the TTL/ECL/CMOS Logic
			CO4	
			CO5	Families and design of various logic gates using them.
			CO5	
				Identify & summarize the functionalities of each layer in
			CO1	the OSI model.
		Data	CO2	Implement Error detection & Error correction techniques.
	00504	Communication	CO3	Develop Network layer routing algorithms.
	8D504	and Computer	004	Design a mechanism which can detect, prevent or recover
		Networks	CO4	from a security attack.
			CO5	Implementation of Hierarchical routing and subnets-
				routing algorithm.
			CO6	Protocols of transport layer and application layer.
		Information	CO1	To learn the fundamental concepts of security attacks,
		Security	001	security services.
			CO2	To apply conventional cryptographic techniques in order
				to do encryption.
	8FC06		CO3	To apply Public key cryptography techniques in order to do encryption.
				To learn IP security Architecture and its role in security
			CO4	framework.
				To apply SSL and TLS for Web Security. To design and
			CO5	develop Intrusion Detection Systems and Firewall.
			CO6	
		Information		Understanding of Symmetric Encryption Algorithms,
		Security Lab	~~.	Asymmetric Encryption Algorithms, Hash and Key
	8FC65		CO1	Exchange, Digital Signature and Digital Envelope,
				Demonstration of NS3 Tool
		IC Applications	CO1	To explore the operating modesof IC 741 OP-AMP.
		Lab	CO2	To design applications using 7410p-Amp
	00076			To understand and implement applications using 555
	8CC76		CO3	Timers
			CO4	To design D to A converters and IC voltage regulators
			CO5	
			CO6	
		Web		Demonstrate the use of HTML tags and be able to design
	8EC77	Technologies Lab	CO1	web pages. Develop dynamic programs involving Java
	OLC //		001	scripts, popup windows in JavaScript along Event
				Handling.
			CO2	Develop scripts using XML and XSLT and read XML

		CO6	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
		CO5	Work as an individual and in a team.
	Summer Industry Internship - I	CO4	Improve their communicative skills and team skills largely improve.
8D580		CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
		CO2	Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
		CO1	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
		CO6	Develop an application in PHP with Database connectivity
		CO5	Implement Java servlets using Apache Tomcat Server for User authentications
		CO4	Develop a Single Page Application with implementation of Scope and Form.
		CO3	Implement Angular with Expressions, Filters, Directives, Controller, and Modules.
			documents using parsers, DOM parser, and SAX parser. Develop JSON files and access them via HTML pages.

### 1.1.1 Template for COs for A20-III Year, II Semester courses/subjects

Year and	Course	Course name	Co's	
regulation	code		CO1	Understanding the concepts of 8086 Architecture
			CO2	Understanding the concepts of Instruction set & developing skills in writing assembly language programs.
	8DC05	Microprocessors and Microcontrollers	CO3	Ability to interface keyboard, stepper motor ADC, DAC to 8086 using 8255
			CO4	Understanding the concepts of 8051 Architecture
			CO5	<i>Exploring the concepts of instruction set of</i> 8051
			CO6	<i>Ability to interface LED, LCD, Keyboard DAC,</i> <i>ADC with 8051</i>
	8CC09	Digital Signal Processing	CO1	Distinguish between CT and DT signals and systems and understand the growing need of DSP and study the concepts of discrete time signals and systems.
			CO2	Represent periodic DT signals as a Fourier series; non-periodic DT signals as a Fourier Transform and use a powerful mathematical

				tool called DFT.
			-	Compute the Fourier Transform of DT signals
			CO3	
				using the FFT algorithms.
			CO1	Realize a digital IIR filter in several forms and
III-II & A20			CO4	structures for a given transfer function H(z)and can design IIR filter as per specifications.
1120				Design of digital FIR filters by several methods
			CO5	as per the given specifications and can realize FIR Filter
			CO6	Understand the need and implement the multirate sampling techniques
				Convert regular expressions to finite automata,
			CO1	Context Free Grammar (CFG) and work with LEX and YACC tool.
			CO2	Parse the input string using CFG through Top down techniques.
	8D602	Automata and Compiler Design	CO3	Parse the input string using CFG through Bottom up techniques.
			CO4	Generate intermediate code from syntax tree and analyze semantic rules.
			CO5	Implement various run time environments strategies.
			CO6	<i>Generate machine dependent code from optimized code.</i>
		Cyber Security and Cyber Laws	CO1	Familiarize the cryptographic procedures and Understand its primitives
			CO2	Outline Security policy in Legislation and Comprehend E-Commerce frame work,
				modelsand its associated threats
			CO2	Justify the role of electronic signatures in E-
	8FC08		CO3	<i>Commerce and summarize the various laws relating to it.</i>
			CO4	Categorize international cyber laws and cybercrimes.
				Explore Penalties, Compensation and
			CO5	Adjunction of violations of provisions of IT Act 2000
			CO6	Classify and Outline theoffences under the Cyberspace law and the Internet in India
		Microprocessors and	CO1	Analyze and apply working of 8086.
		Microcontrollers Lab	001	Compare the various interface techniques.
	8DC66		CO2	Analyze and apply the working of 8255, 8279,8259, 8251, 8257 ICs and design and
				develop the programs.
			CO3	Learning the Communication Standards.
		Signal Processing and		Analyze and simulate various signals and study their
		Communication Lab	CO1	properties in time and frequency domain
			CO2	Understand the LTI system operation and learn to
				find the response for other related applications
	8D664		CO3	Grasp the nature and significance of communication systems using various modulation and demodulation technique like AM, FM, ASK, FSK and PSK
			CO4	Understand and demonstrate the process involved in analog to digital conversion
			CO5	Understand the concept of sampling rate conversion in terms of Interpolation and Decimation

			CO6	Analyze and simulate various signals and study their
			000	properties in time and frequency domain
				Implement the lexical analyzer using
			CO1	lexical analyzer generating tool such as
		Automata and Complier Design		LEX.
	8D665	Lab		1. Design top down parser for the given
			CO2	
				language
			CO3	2. Design bottom up parser for the given
			COS	language using YACC parser tool.
		Group Project		Use the concepts learned in the courses, so far,
		1 5	CO1	in conceptualizing, designing and executing the
			001	modules of the projects.
				<i>Exhibit the interest in learning the modern tools</i>
				ê
			CO2	and technologies through the bridge courses
				arranged in the college, beyond the curriculum,
				and hence developing the software.
	8D677			Inculcate an enthusiasm to use the creative
	00077		CO3	ideas to build the innovative projects which are
			005	meeting the current needs of the market and
				society as a whole.
			004	Improve their communicative skills and team
			CO4	skills largely improve.
			CO5	Work as an individual and in a team.
			005	Use the concepts learned in the courses, so far,
			CO6	in conceptualizing, designing and executing the
			000	
				modules of the projects.
				Assessed the knowledge of the students in
	8D688	Comprehensive Viva Voce-V	CO1	the Core and Elective subjects that they
			COI	have studied till the completion of that
				academic year.
	8ZC22	BASICS OF		The students' will acquire basic knowledge on
	02022	ENTREPRENEURSHIP(WADHWANI	CO1	Skills of Entrepreneurship.
		MODEL)		<i>The students' will understand the techniques of</i>
		(Open Elective-I)	000	
			CO2	selecting the customers through the process of
				customer segmentation and Targeting
			CO3	Business Models and their validity are
			005	understood by the students'.
				The basic cost structure, Revenue Streams and
			CO4	the pricing strategies are understood by the
				students'.
			<b>a</b>	The students' will acquire knowledge about the
			CO5	project management and its techniques.
				The students' get exposure on marketing
			CO6	strategies and business regulations for the Start
			000	
	97025	RASICS OF INDIAN ECONOMY		up. Gain knowledge relating to Economics, various
	8ZC25	BASICS OF INDIAN ECONOMY (OPEN ELECTIVE-I)	CO1	о о
		(OI EN ELECTIVE-I)		sectors and its growth
			_	Will gain knowledge relating to various
			CO2	concepts of National income and related
				aggregates
		[	<u> </u>	Students will learn about Indian Industrial
			CO3	policy and benefits of LPG to India
			<b>a</b> ~ ·	Comprehend knowledge relating to Fiscal
1			CO4	policy & Taxation system in India

CO5	Learn about inflation & business cycles.
CO6	Know about the BoP and its influence on economy

1.1.1	<b>COs for A18 Regulation IV</b>	V Year, I Semester	courses/subjects-ECM
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Year and regulation	Course code	Course name	Co's	
8	7D706	Embedded and Real Time Systems	CO1	Identify and summarize the characteristics and challenges of designing an embedded system
			CO2	Utilize and apply ARM architecture for Embedded System Design
			CO3	ARM Architecture and Programming (Assembly and C)
			CO4	Design simple input output hardware interfaces using ARM
			CO5	Explain the concepts and design requirements related to a real time systems
			CO6	Getting embedded software into target system – Debugging
	7D707	VLSI Design	CO1	Understand the existing device technologies and IC fabrication process
			CO2	<i>Explore and analyze the electrical properties of MOS device &amp; Inverter design and analysis</i>
			CO3	Do physical design of basic logic gates, combinational and sequential circuits
			CO4	Analyze the paracitic effect on IC power and performance
			CO5	Design memory cells and basic data-path units
			CO6	<i>Explore on the need for testing and design verification of</i> <i>VLSI circuits</i>
				After completion of this course, the student should be able to
	7DC72 Embedded Systems Lab	Embedded		design simple input output hardware interfaces using
			CO1	
TV T 8- A 10		Systems Lab		ARMLPC2148
IV-I & A18	7DC73 VLSI Lab		CO1	To learn Verilog HDL and implement digital circuits on FPGA using Xilinx tools.
		VLSI Lab		To draw and simulate layout for digital logic gates
			CO2	using Micro-wind tool
			CO1	Install and run the Python interpreter
			CO1 CO2	Apply the best features of mathematics
	7D788 P	Python Programming Lab	CO2	Describe the Numbers
			CO4	Understand and summarize different File handling operations
		1240	CO5	· L · · · · · · · · · · · · · · · · · ·
			CO6	
	7D779 Project – I		CO1	Develop plans with relevant people to achieve the project's goals
		Project I	CO2	Break work down into tasks and determine handover procedures
		Project – I	CO3	Identify links and dependencies, and schedule to achieve deliverables
		CO4	Estimate the human and physical resources required, and make plans to obtain the necessary resources	

			CO5	Allocate roles with clear lines of responsibility and accountability with team spirit.
			CO6	Design the architectures and various diagrams.
			CO7	Implement the designs and present the project execution.
			CO1	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
	7D785	Evaluation of Summer	CO2	Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
	10/85	Industry Internship-II	CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
			CO4	Improve their communicative skills and team skills largely improve.
			CO5	Work as an individual and in a team.
			CO6	
			CO1	Understand the importance of big data
		Big Data 18 Analytics (PE- III)	CO2	Understand challenges with big data
			CO3	Knowledge about the technological developments in big data environment
	7EC18		CO4	Understanding about map reduce work flows
			CO5	Knowledge about nosql data environment.
			CO6	Analysis with Hadoop and related tools
			CO7	Capability of understanding the usage of big data in context to cloud and other technologies.
			CO1	1) Familiarize the functional/operational aspects of crypto currency ECOSYSTEM.
	7FC16	Block Chain Technologies	CO2	2) Understand emerging abstract models for Block chain Technology.
		(PE-III)	CO3	3) Identify major research challenges and technical gaps existing between theory and practice in crypto currency domain
			CO1	Realize the importance of cyber security and various forms of cyber attacks and countermeasures.
	7EC13	Cyber Security & Cyber Laws Semantic (PE- III)	CO2	Get familiar with the E-Commerce frame work and the various model of E-Commerce, security threats to cyberspace and E-Commerce and the basic laws associated with it.
			CO3	Understand the role of electronic signatures in E-Commerce and the role of certifying authority in regulating license with the various laws relating to it.
			CO4	Understand the various laws related to trades and WTO, council of Europe related to cyber crimes and have awareness with the various penalty and compensation in failure to protect data.
			CO5	Get familiar with obscenity and pornography in cyber space and understand the violation of Right of privacy on Internet.

		CO6	<i>Elucidate the various chapters of the IT Act 2008, power of</i> <i>Central and State Government to make rules under IT Act</i> 2008.
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## 1.1.1 COs for A18 Regulation IV Year, II Semester courses/subjects

Year and regulation	Course code	Course name	Co's	
			CO1	Develop plans with relevant people to achieve the project's goals
			CO2	Break work down into tasks and determine handover procedures
	7D880		CO3	Identify links and dependencies, and schedule to achieve deliverables
	/D880	Project-II	CO4	Estimate the human and physical resources required, and make plans to obtain the necessary resources
			CO5	Allocate roles with clear lines of responsibility and accountability with team spirit.
			CO6	Design the architectures and various diagrams.
			CO7	Implement the designs and present the project execution.
			CO1	Describe the characteristics of cloud
			CO2	Describe the cloud services.
IV-II & A18	7EC20	Cloud Computing (PE-V)	CO3	Understand different architectures for cloud applications, Creation and running of python programs, running amazon ec2 instance
			CO4	Understand Data Intensive applications and future trends of Internet Clouds supporting Mobile Computing, Ubiquitious Computing and Social Networking
			CO5	Discuss mapreduce and image processing app on cloud.
			CO6	Discuss cloud security architecture



## Course Outcomes of CSE - (Cyber Security) Department

SREENIDHI INSTITUTE OF SCIENCE AND





### Department of Computer Science & Engineering (Cyber Security) COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and regulation	Course code	Course name		Co's
			CO1	Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.
			CO2	Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.
		Engineering Chemistry	CO3	Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
	9HC04	Engineering Chemisury	CO4	Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
			CO5	Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques
I-I & A22			CO6	Learn and implement synthesis of drug molecules and learn fundamentals of analytical techniques like electronic, vibrational and rotational spectroscopy.
	9FC01	Problem Solving using C	CO1	To formulate simple algorithms for arithmetic, logical problems and to translate the algorithms to programs(in C language)
			CO2	To test and execute the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion
			CO3	To use arrays to formulate algorithms and programs and apply programming to solve matrix addition and multiplication problems and searching
			CO4	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.

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			CO5	To use pointers to formulate algorithms and programs.
			CO6	To apply files to do various file manipulation functions.
		MATRIX ALGEBRA AND CALCULUS	CO1	Check the consistency or inconsistency of a linear system and can solve the problems.
			CO2	Find the Eigen values and Eigen vectors and can solve the problems associated with these concepts.
			CO3	Find the nature, index and signature of the quadratic form.
	9HC11		CO4	Verify the applicability of mean value theorems and also can express the givenstandard function in series form using Taylor's and Maclaurin series.
			CO5	Find the solutions of first order first degree differential equations and solve the problems on Newton's law of cooling, Natural growth and decay.
			CO6	Solve higher order ordinary differential equations with constant coefficients using some standard methods.
		Essential English Language Skills (EELS)	CO1	Demonstrate competence with suitable accuracy in vocabulary, and language fluency.
			CO2	State the definition of nouns, verbs, adjectives, and adverbs.
	9HC01		CO3	Identify the differences of each tense and use the tenses accurately.
			CO4	Identify specialized reading strategies for specific types of texts
			CO5	Produce written work that is substantive, organized, and grammatically accurate
		Oral Communication Lab-I		Describe people, objects and situations using simple sentences.
	9HC61			Use appropriate tenses and expressions in different contexts of conversations. Identify major areas of concern in their
				recently major areas of concern in them

				oral communication and address them.
				Create a SMART plan to enhance their
				communication skills in English
		Engineering Chemistry Lab	CO1	Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.
			CO2	Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.
			CO3	Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
	9HC64		CO4	Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
			CO5	Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques
			CO6	Learn and implement synthesis of drug molecules and learn fundamentals of analytical techniques like electronic, vibrational and rotational spectroscopy.
			CO1	Enumerate the algorithms for simple problems
	9FC61	Problem Solving using C Lab		Classify the given algorithms to a working and correct program
				Correct the syntax errors as reported by the compilers
				Identify and correct logical errors encountered at run time
				Write iterative as well as recursive programs
				Represent data in arrays, strings and structures and manipulate them through a program
				Declare pointers of different types and use them in defining self referential structures.
				Create, read and write to and from simple text files.
				Use various types of conventional manufacturing Processes
	9BC61	Workshop/Manufacturing		Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience
		Processes Lab		manufacturing of components by machining like shafts, holes & threaded
				holes, surface finishing of components etc. Produce small devices / products

				/appliances by assembling different
				components
	9HC07	Engineering Physics	CO1	Differentiate the wave and particle, de- Broglie matter waves its experimental evidence, Schroedinger's wave concept and its application for a particle in one dimension box.
			CO2	Explain about emission, its types, laser principle, types, working and its applications and to reveals about TIR principle, optical fiber-types and signal propagation, attenuation, communication system and applications of optical fibers (sensors and medical endoscopy)
			CO3	Reveals about the magnetism-its origin and types, Hysteresis, domain theory, Superconductivity, experimental facts, theoretical analysis, types of superconductors and its applications.
I-II & A22			CO4	Explain the basic concepts of dielectric materials, polarization and its types, local fields, frequency and temperature effect on dielectrics and their applications (Piezo, Ferro and Pyro electricity).
			CO5	Explain semiconductor behavior, types, carrier concentration, Hall effect, Thermistor, demonstrate and analyze semiconductor devices like a PN-junction, I-V characteristics, LED, solar cell, photo diode and their applications.
			CO6	Summarize nano& bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods (physical & chemical), analysis the techniques like XRD & TEM.
	9EC01	Data Structures	CO1	Design the programs using structures, unions and enum.
			CO2	Demonstrate the concepts of Abstract data type and also applications of stacks and queues.
			CO3	Implement basic operations on singly, doubly and circular linked list.
			CO4	Solve problems involving Binary Search trees and AVL trees.

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			CO5	Develop algorithms for various searching and sorting techniques and analyze their performance.
			CO6	Articulate the concepts of graphs, heaps and hashing.
			CO1	Find the limits and test for the continuity and differentiability of a function.
			CO2	Solve the problems on multiple integrals.
			CO3	Solve linear and nonlinear first order partial differential equations.
	9HC12	Advanced Calculus	CO4	Find Series expansion a function defined over the intervals.
			CO5	Find directional derivative, gradient, divergence and curl of a function.
			CO6	Solve problems of line, surface and volume integrals.
		Engineering Graphics	CO1	Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
			CO2	Understand Orthographic projections and draw projections of simple drawing entities such as points Lines.
			CO3	Draw projections of different types of regular Planes, solids in various positions wrt principal planes of projection
	9BC01		CO4	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections
			CO5	Construct Isometric Scale, Isometric Projections and Views
			CO6	Convert Isometric to orthographic views and understand basic sketching using computer aided design (CAD) software.
			CO1	Outline the fundamentals of electrical engineering and DC machines
			CO2	Summarize the principles of AC circuits.
	9AC48	Basic Electrical and Electronics Engineering	CO3	Inspect the principle and operation of three phase induction motor and measuring instruments
			CO4	Comprehend the principle and operation of diode.
			CO5	Explain the principle and operation of transistor.
			CO6	Enlist and describe the principles of digital

				electronics.
				Strike a conversation and engage in
			CO1	effective small talk
				Lose stage fear and confidently interact
			CO2	with others in different roles and tap their
			001	creative side.
			GOO	Speak for a minute, fluently and
	9HC62	Oral Communication	CO3	cohesively.
		Lab-II	COA	Make official presentations with effective
			CO4	use of PPTs.
			CO5	Engage in group discussions in a confident
			0.05	and professional manner.
			CO6	Shed fear of questions from the audience
			000	and the interviewers.
				Understand the concepts of photo electric
				effect, importance, photo current, colour
				filters, optical sensors.
				Know about the light properties-
				dispersion, prism, spectrometer and
				minimum deviation arrangement.
				Recognize the difference between the interference and diffraction, grating, laser
				characteristics.
				Analyze the concepts of fiber optics,
				fundamentals, numerical aperture its
				importance, attenuation in fiber and
				applications
				Understand and search to apply the
				fundamentals of magnetic induction,
	9HC66	Engineering Dhysics Lab		Ampere's law, Oersted's law and the Biot-
		Engineering Physics Lab		Savart law
				Know the difference between AC and DC
				fundamentals, Magnetostriction,
				resonance, air column vibrations
				Analyze the LCR circuit combination,
				parallel, series electrical resonance,
				inductance, reactance, capacitance and
				electrical and electronic fundamentals
				Summarize the fundamentals of modulus-
				types, stress, strain, elasticity, plasticity and Hook's law.
				Analyze the concept a semiconductors,
				types, calculation of energy gap of a
				semiconductor diode and importance
				Analyze the difference between normal
				diode & LED, forward bias, reverse bias,
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				I-V characteristics, direct and indirect
				band gap semiconductors.
			CO1	Write programs on structures and unions.
			CO2	Implement Stacks, Queues and circular
			002	queues using arrays.
9		Data Structures using C	CO3	Write programs to implement basic
	9EC61	Lab	005	operations on various types of linked list.
		Lut	CO4	Implement insertion and traversal
				operations on binary search tree
			CO5	Develop programs on various searching,
				sorting algorithms.
	8HC16	Probability and Statistics	CO1	Solve the random variable problems and
				probability distributions.
			CO2	Estimate the parameters and solve the
				problems using central limit theorem.
			CO3	Test the hypothesis related to samples concerning to the means and proportions
			005	of large size samples.
				Apply and solve the problems using t-test,
			CO4	Chi-square test also testing the hypothesis
				problems on small size samples, goodness
				of fit and independence of attributes.
			COF	Solve the problems on measures of central
			CO5	tendency, Correlation
			CO6	Classify and differentiate various
				regression models
			CO1	Understand the fundamentals of electrical
II-I A20				engineering and DC machines.
11 1 1 20			CO2	Understand the principles of AC circuits.
				Understand the principle and operation of
			CO3	three phase induction motor and
	8AC48	<b>Elements of Electrical and</b>		measuring instruments.
	04040	Electronics Engineering	CO4	Comprehend the principle and operation
			007	of diode.
			CO5	Understand the principle and operation of
			005	transistor.
			CO6	Understand the principles of digital
				electronics
	8EC02	Object Oriented		Comprehend the fundamentals of Java,
		Programming through Java	CO1	Classes, Objects and design the java
			001	programs using constructors and String
				handling methods.
			CO2	Design the programs using inheritance,
			002	polymorphism and interface.

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			CO3	Develop programs using Packages, I/O Streams and collections.
			CO4	Apply the concepts of Exception handling and Multithreading for various scenarios.
			CO5	Create programs using AWT, Swings and develop applications using event handling.
			CO6	Develop applications using Applets and
				client server programs using networking
				concepts.
			CO1	Evaluate elementary mathematical arguments and identify fallacious reasoning (not just fallacious conclusions).
			CO2	Reasoning about arguments represented in Predicate logic.
	8F303	Discrete Mathematics	CO3	Perform operations on sets, functions, relations.
	01 505		CO4	Solve problems that involve: computing permutations and combinations, Binomial and Multinomial theorems
			CO5	Analyze and deduce problems involving recurrence relations and generating functions
	8DC10	Computer Organization & Architecture	CO6	Apply graph theory Spanning trees, planar graphs, Isomorphism and connectivity
			CO1	Perceive basic operational concept of computer and data processing.
			CO2	Use data types with instruction set of specified architecture
			CO3	Justify different control unit design and algorithms for various operations.
			CO4	Elaborate basic architecture of 8086 processor
			CO5	Write assembly language programming and debug to 8086
			CO6	Interface devices to 8086 processor
			CO1	Apply process models in real world software products.
			CO2	Classify software requirement specification document.
	8D310	Software Engineering	CO3	Design system models and user interface.
			CO4	Evaluate test strategies for various software's.
			CO5	Describe product metrics, risks.
			CO6	Comprehend the quality management
				This course also discusses their role in their
	8HC17	Universal Human Values	CO1	family. It, very briefly, touches issues related
				to their role in the society and the nature,

				which needs to be discussed at length in one more semester for which the foundation course named as "H-102 Universal Human Values
			CO2	Understanding Harmony is designed which may be covered in their III or IV semester. During the Induction Program, students would get an initial exposure to human values through Universal Human Values – I. This exposure is to be augmented by this compulsory full semester foundation course.
			CO1	Write programs to generate Prime numbers, Roots of quadratic equation and Fibonacci series.
			CO2	Write small application such as banking system.
	8EC62	Object Oriented Programming through Java Lab	CO3	Write programs on operator, function overloading and dynamic method dispatch.
			CO4	Write programs to implement interface and packages.
			CO5	Explain and write programs to implement threads.
			CO6	Write programs to implement applets and event handling.
				Write an application to implement client and server scenario
	8EC77	Software Engineering and Computer Organization Lab	CO1	Identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.
			CO2	Outline the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving.
			CO3	Define and design models for the requirements stated in the software project.
			CO4	Design class, object and interactive diagrams and know their significance.
			CO5	Design advanced behavioral and architectural modeling and work on case studies.
	8AC77	Elements of Electrical and Electronics Engineering Lab	CO1	Understand the working of single-phase transformer under different conditions, the performance of three phase induction motor,

				different speed control methods of DC motor with and without loading with its performance.
			CO2	Understand the applications of Thevenin's Theorem in circuit analysis.
			CO3	Identify, Specify and test R, L, C Components (Colour Codes), Potentiometers, Switches, Coils, Relays.
			CO4	Identify, Specify and test Active Devices, Diodes, BJTs, Low power JFETs.
			CO5	Explain and demonstrate working of PN Junction and Zener diode.
			CO6	Explain and demonstrate working Half and Full wave Rectifier without filters.
				Demonstrate working of CE characteristics and its application as an amplifier
			CO1	Identify topics related to Computer Science and Engineering domain
	8J386	Technical Seminar - III	CO2	Collect, survey and organize content in PPT form
			CO3	Present seminar in an effective manner
	8EC41	Introduction to Cyber Security	CO1	Describe typical threats to modern digital systems,
			CO2	Outline techniques of defense against each threat.
			CO3	Describe the fundamentals of modern cryptography
			CO4	Compare popular computer and network security mechanisms and protocols used in Authentication and Remote Access.
			CO5	Categorize the procedures used in the intrusion detection and prevention systems.
II-II A20			CO6	Identify security tasks that need to be used in e-banking by experts
			CO1	To Study in detail about various analog and digital modulation and demodulation
			CO2	techniques.
	8FC05	Data Communications and	CO3	To have a thorough knowledge of various multiplexing schemes and Data communication protocols,
		Computer Networks	CO4	To Learn flow control, error control and access control mechanisms.
			CO5	To Learn routing and congestion control algorithms, internet protocols.
			CO6	To Understand Transport layer entities such as DNS and HTTP

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			CO1	Analyze importance and significance of models, Database languages, architecture and design of Data Base Systems.
			CO2	Understand Relational Model – Integrity Constraints, Logic
			CO3	Analyze data base Design and Views of databases, queries using Relational Algebra and Relational Calculus.
		Database Management	CO4	Solve Queries with Comparison Operators, Aggregative Operators and nested queries. Queries with joins.
	8EC03	Systems	CO5	Apply Schema refinement through all forms of Normalization to eliminate database redundancy.
			CO6	Apply ACID properties in transaction. Ensuring serializability in concurrent
				transactions. Concurrent control methods and recovery of transaction.
				Analyze External Storage Organization mechanisms and apply Indexing in databases for query optimization to
				enhance system performance
		Operating Systems	CO1	Understand the functional architecture of an Operating System with usage of system calls.
			CO2	Analyze various process scheduling algorithms & pragmatics of scheduling algorithms used by various Operating Systems.
	8EC06		CO3	Solve issues related to process synchronization and Deadlocks in the Operating System.
			CO4	Illustrate the concepts of Memory Management.
			CO5	Outline the directory structure & analyze disk scheduling algorithms.
			CO6	Summarize the aspects of Protection and
				Security, and understand the concepts of I/O systems.
			CO1	Apply the rules of Boolean algebra to simplify Boolean expressions.
			CO2	Simplify of Boolean expressions using K-map.
	8CC55	Digital Electronics	CO3	Design MSI combinational circuits such as full adders, multiplexers, decoders, encoders.

				Code converters.
			CO4	Design basic memory units (latches and flip- flops) and sequential circuits such as counters and registers
			CO5	Create digital design using PLD's such as ROM's, PLA's, PAL s.
			CO6	Design the digital controllers using Algorithmic State Machine Charts
			CO1	Acquire the basics of Managerial Economics at Micro level, Demand analysis and production analysis in particular
			CO2	Gain exposure on Cost concept, Revenues and Market structure and describe the concepts
	8ZC01	Economics, Accountancy and Management Science	CO3	Comprehend the basic concepts of Accounting, Double entry system and Bookkeeping.
			CO4	Interpret the concepts of Capital expenditure, Revenue expenditure and Final accounts ad their significance.
			CO5	Gain knowledge and elaborate the basics of Management, its principles and various functions performed in organization.
			CO6	Recognize various personality traits, perception, attitudes of individuals working in organization
			CO1	Assess themselves using SWOT analysis.
			CO2	Appraise the importance of certain soft skills like time management and goal setting.
			CO3	Improve their verbal ability to handle the competitive exams.
	8HC03	Soft Skills	CO4	Enhance their team skills and design thinking capabilities for effective problem solving and decision making.
			CO5	Know their emotional quotient which guides their thinking, behavior and helps them manage stress efficiently.
			CO6	Equip themselves with the prerequisites, and relevant techniques to effectively attend corporate interviews
	8EC63	Database Management Systems Lab	CO1	Create tables for a database and apply Queries using ANY, ALL, IN, EXISTS, NOTEXISTS, UNION, INTERSET, Constraints.

		CO3 CO4	<ul> <li>HAVING], Conversion functions and use string functions for a given application.</li> <li>Explain and write programs using PL/SQL programs using exceptions, COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.</li> <li>Develop programs using WHILE LOOPS, FOR LOOPS, nested loops using BUILT–IN Exceptions and write Procedures.</li> <li>Write Programs for stored functions invoke</li> </ul>	
			Programs for packages specification. Describe and write programs using features of	
			CURSORs and its variables.	
8EC66	Operating Systems Lab	CO1	Develop Programs implementing TriggersSimulate and implement operating systemconcepts such as scheduling, deadlockmanagement, page replacement techniques,file management and memory management	
		CO1	Implement and analyze framing methods of the data link layer.	
8EC65 Computer Networks Lab	CO2	Illustrate and implement error detection &		
			-	
8J479	Comprehensive Test and Viva Voce - IV	CO1	Assesed the knowledge of the students in the Core and Elective subjects that they have studied till the completion of that academic year	
8J487	Technical Seminar – IV	CO1	Identify topics related to Computer Science and Engineering domain or disruptive technologies	
			PPT form	
		CO3 Present seminar in an effective manner		
Course code	Course name		Co's	
		CO1	The students will acquire basic knowledge on Skills of Entrepreneurship.	
8ZC22	Basics of Entrepreneurship	CO2	The students will understand the techniques ofselecting the customers through the process of customer segmentation and Targeting	
		CO3 CO4	Business Models and their validity are understood by the students. The basic cost structure, Revenue Streams and the	
	8EC65 8J479 8J487 Course code	8EC65     Computer Networks Lab       8J479     Comprehensive Test and Viva Voce - IV       8J487     Technical Seminar – IV       Course code     Course name       8ZC22     Basics of	8EC65         Computer Networks Lab         CO1           8EC65         Computer Networks Lab         CO2           CO3         CO4         CO3           CO4         CO5         CO4           SU479         Comprehensive Test and Viva Voce - IV         CO1           8J487         Technical Seminar - IV         CO1           SU479         Course name         CO1           SU479         Course name         CO1           8J487         Entrepreneurship         CO1	

				pricing strategies are understood by the students.
			CO5	The students will acquire knowledge about the project management and its techniques.
			CO6	The students get exposure on marketing strategies and business regulations for the Start up.
			CO1	Summarize the characteristics of cloud models.
		Cloud Computing	CO2	Demonstrate the different kinds of cloud services.
III-I &	8EC20		CO3	Analyze different architectures for c through python programs
A20			CO4	Assess the performance of cloud services and summarize the innovative applications of IOT oncloud.
			CO5	Design architecture of an Apps such as map reduce, image processing app etc on cloud.
			CO6	Understand various security aspects in cloud.
		Information Security	CO1	Understand the fundamental concepts of SecurityAttacks and security standards with the model for network Security.
			CO2	Review and analyze conventional cryptographic techniques and authentication
	8FC06		CO3	Review and analyze public cryptographic techniques and outline the concepts of Kerberosand email privacy
			CO4	Recognize erchitecture leave management
			CO5	Outline the various web security threats and protocols
			CO6	Understand Intrusion Detection System Design principles of Firewalls
			CO1	Demonstrate the use of HTML tags. Apply Stylesusing CSS and Bootstrap.
			CO2	Develop dynamic programs using Java script and Typescript.
	8EC07	Web Technologies	CO3	Develop scripts using XML and validate using parsers and design a data-interchange formatusing JSON.
			CO4	Comprehend the uses of Web servers and design the server-side scripts using Servlets

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			CO5	Design and develop server-side and scripts components using PHP.
			CO6	Design responsive web applications with Forms,Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.
			CO1	alyze worst-case running times of algorithms usingmptotic analysis.
			CO2	Synthesize divide and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and-conquer algorithms.
	8FC05	Design and Analysis of Algorithms	CO3	scribe the greedy paradigm and explain when an orithmic design situation calls for it. Recite orithms that employ this paradigm. Synthesize edy algorithms, and analyze them.
			CO4	mprehend the concept of dynamic programming orithms, their applications and analyze them.
			CO5	alyze the Backtracking and Branch and Bound orithms and also identify the scenarios for its plicability.
			CO6	mprehend the concept of P and NP Problems and usage in the applications.
			CO1	Learn about various data types, types of datasets a data quality
			CO2	Implementation of R fundamentals and perform factors and data frames.
	8MC13	Fundamentals of Data	CO3	Implementation of data structures iterative programming & function concepts using R
	olvic 15	Science	CO4	Learn about data visualization techniques
			CO5	Learn about dimensionality reduction based on
			CO6	examples illustrations Perform predictive data analysis on variety of data along with appropriate statistical tests using R.
			CO1	Understand about ecosystem and energy flowamong the organisms.
			CO2	Know the resources available, use of them and overexploitation of the resources in the nature.
	8HC05	Environmental Science and Ecology	CO3	Learn the value, use and value of biodiversity.
			CO4	Understand the causes and effect of pollution and implement measures in control of
			CO5	Understand the sustainable development and implement green technology for sustainable development.

			CO6	Learn and implement policy to protect theenvironment.
	8JC61	Web Technologies and Information Security	CO1	Design and implement dynamic webpages using HTML, Javascript, XML, servlets, and PHP.
		Lab		Implement various cryptographic, hashing and key exchange techniques.
			CO1	Implement Merge sort algorithm for sorting a list of integers in ascending order, Dijkstra's algorithm for the single source shortest pathproblem.
			CO2	Implement Prim's algorithm to generate minimum cost spanning tree.
	8MC61	Design and Analysis of Algorithms and R	CO3	Solve the job sequencing with deadlines problem using greedy algorithm.
	Programming Lab	Programming Lab	CO4	Design the solution for the 0/1 knapsack problemusing implement Dynamic Programming and implement.
			CO5	Using Dynamic programming approach solve the Optimal Binary search Tree problem.
			CO6	Design and implement n-queens problem usingbacktracking approach.
	01401	Summer Industry Internship –I (Evaluation	CO1 CO2 CO3	
	8J491	of Summer Internship- 2 Internal Reviews and 1External Evaluation)	CO4 CO5	
			CO6	Gain knowledge on the stages of Startup and the
			CO1	turbulence environment it undergoes and the stages related to growth of the Startup.
			CO2	Exposed to the various business models and criticallyevaluating the effectiveness of the business models and products
	8ZC23	Advanced Entrepreneur ship	CO3	Understand the method of business traction, create rolesand build their A- team
III-II& A20			CO4	Understand the various channels of revenue building and exploration of new revenue avenues.
1120			CO5	Understand the need of sales planning and people plan andalso financial modeling
			CO6	Exposed to the legal implications affecting the company'sprospects and identifying right mentors and advisors to support startups
			CO1	Understand the importance of business intelligenceand its applications in today's world.

		CO2	Illustrate the different form of analytics such as
8EC19	Business Intelligence		business analytics, predictive analytics.
		CO3	Compare in detail the various aspects of business
			intelligence.
		CO4	Understand the technological components of
		CO5	Analyze and understand the broad concepts in
			prescriptive analytics with Decision Tables.
		CO6	Apply business intelligence process for
		CO1	Understand the fundamentals of Data Mining and
			Identify the techniques used in data preprocessing.
95-004	Data Warehousing and	CO2	Understand the fundamentals of Data Warehousing and issues of mining with respect toarchitectures, technologies such as OLAP.
8EC04	Data Mining	CO3	Learn insights of Data Mining Primitives and
			Infer the significance of Concept Description.
		CO4	Apply the algorithms for mining association rules in large databases.
			Discuss and apply the models of
		CO5	classification and use those models for the prediction of the new
		CO6	samples.Apply various clustering techniquesavailable for
			numerous applications. Identify the optimal clustering technique for a particular application
		CO1	Familiarize the cryptographic procedures and
		CO2	Understand its primitives Outline Security policy in Legislation Comprehend E-Commerce framework, models and its associated threats
8FC08	Cyber Security and Cyber Laws	CO3	Justify the role of electronic signatures in
		CO4	relating to it. Categorize international cyber laws
		CO5	cybercrimes. Explore Penalties, Compensation and Adjunction of violations of provisions of IT 190

				Act 2000
			CO6	Classify and outline the offences under the Cyberspace law and the Internet in India
	8LC01 Introduction to Artificial Intelligence	CO1	Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Search algorithm for a problem and estimate its time and space complexities. Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.	
		CO3	Learn different knowledge representation techniques.	
			CO4	Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and Space complexities.

			CO5	Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyzeSupervisedLearningvs.LearningDecision Trees.
			CO1	Design the finite automata different Languages
			CO2	Construct finite Automata for a given regular expressions, and derive strings with suitable examples. Conceptualize context free grammars and normal forms.
		Automata Theory and	CO3	Design the push down automata and Turing Machine for complex languages.
	8FC07	Compiler Design	CO4	Understand LEX tool and relate parsing techniques
			CO5	Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (O), LR(1), LR(K) grammar and use YACC tool.
			CO6	
		Data Mining Lab and Artificial Intelligence Lab	CO1	Demonstrate the classification, clustering techniques on the data sets.
	8JC62		CO2	Comprehend the results obtained in the clustering, Association and Classification techniques applied on the data sets with varied input parameters.
			CO3	Implement the simple AI programs using prolog.
			CO1	Use Autopsy tool to perform Memory capture and analysis.
	8JC63	Cyber Security and Compiler Design Lab	CO2	Demonstrate Network analysis using Network miner tools
			CO3	Demonstrate Lex and Yacc tools to simulate the grammar types used in the compilers.
	8J681	Comprehensive Viva Voce	CO1	Describe the core concepts of the subjects that they have studied till the completion of that academic year.
			CO2	Comprehensive Viva Voce will be conducted in third year second semester for 100 marks. Out of 100 marks 30 marks are evaluated internally and 70 marks for external evaluation.
			CO3	<b>Internal:</b> Comprehensive Viva Voce is conducted twice in a semester and evaluated for 30 marks each and average will be considered for internal.

			CO1	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
			CO2	e
				and technologies through the bridge courses
				arranged in the college, beyond the curriculum,
	8J694	Group Project		and hence developing the software.
	01094		CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting
				the current needs of the market and society as a
				whole.
			CO4	Improve their communicative skills and team
				skills largely improve.
			CO5	Work as an individual and in a team.



# Course Outcomes of CSE - (AIML) Department

SREENIDHI INSTITUTE OF SCIENCE AND

### Department of Computer Science & Engineering (Artificial Intelligence & Machine Learning) COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

SREENIDH

EDUCATIONAL GROUP

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SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY

Year and	Course	Course name		Co's
regulation	code			
			CO1	Understand and analyse microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.
			CO2	Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.
		Engineering	CO3	Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
	9HC04	Chemistry	CO4	Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
			CO5	Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques
			CO6	Learn and implement synthesis of drug molecules and learn fundamentals of analytical techniques like electronic, vibrational and rotational spectroscopy.
			CO1	To formulate simple algorithms for arithmetic, logical problems and to translate the algorithms to programs(in C language)
	9FC01	Problem Solving using C	CO2	To test and execute the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion
			CO3	To use arrays to formulate algorithms and programs and apply programming to solve matrix addition and multiplication problems and searching
I-I & A22			CO4	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
			CO5	To use pointers to formulate algorithms and programs.
			CO6	To apply files to do various file manipulation functions.
		MATRIX ALGEBRA AND	CO1	Check the consistency or inconsistency of a linear system and can solve the problems.
			CO2	Find the Eigen values and Eigen vectors and can solve the problems associated with these concepts.
		CALCULUS	CO3	Find the nature, index and signature of the quadratic form.
	9HC11	CILLCOLOS .	CO4	Verify the applicability of mean value theorems and also can express the given standard function in series form using Taylor's and Maclaurin series.
			CO5	Find the solutions of first order first degree differential equations and solve the problems on Newton's law of cooling, Natural growth and decay.
			CO6	Solve higher order ordinary differential equations with constant coefficients using some standard methods.
		Essential English	CO1	Demonstrate competence with suitable accuracy in vocabulary, and language fluency.
	9HC01	Language Skills	CO2	State the definition of nouns, verbs, adjectives, and adverbs.
	98001	(EELS)	CO3	Identify the differences of each tense and use the tenses accurately.
			CO4	Identify specialized reading strategies for specific types of

				texts
			005	Produce written work that is substantive, organized, and
			CO5	grammatically accurate.
			CO6	Understand the appropriate use of active and passive voice in certain context
			CO1	Describe people, objects and situations using simple sentences.
		Oral Communication	CO2	Use appropriate tenses and expressions in different contexts of conversations.
	9HC61	Lab – I	CO3	Identify major areas of concern in their oral communication and address them.
			CO4	Create a SMART plan to enhance their communication skills in English
			CO5	
			CO6	
			CO1	To reparation of Inorganic compounds, To determine surface tension of a liquid
			CO2	To determine viscosity of lubricant, To determine acid value of an oil.
	9HC64	Engineering	CO3	To estimate hardness of water, To analyze the amount of chloride content.
	90004	Chemistry Lab	CO4	To determine cell constant and conductance of solutions, To determine redox potential and emf of solutions.
			CO5	To determine the rate constant of acid, To synthesize a polymer (Thiakol rubber / Urea-Farmaldehyde resin).
			CO6	To synthesize a drug- Aspirin, To estimate of Mn <sup>+7</sup> by Colorimetry method.
			CO1	To be able to understand the fundamentals of programming in C Language
		Problem Solving	CO2	To be able to write, compile and debug programs in C
	9FC61	using C Lab	CO3	To be able to formulate problems and implement in C.
	91/001	-	CO4	To be able to effectively choose programming components
			CO5	To solve computing problems in real-world.
			CO6	To be able to understand the fundamentals of programming in C Language
			CO1	Use various types of conventional manufacturing Processes
		Workshop /	CO2	Manufacture components from wood, MS flat, GI Sheet etc. – hands on experience
	9BC61	Workshop / Manufacturing Processes Lab	CO3	Manufacturing of components by machining like shafts, holes & threaded holes, surface finishing of components etc.
		110005505 Lau	CO4	Produce small devices / products /appliances by assembling different components
			CO5	
			CO6	
			CO1	Learns Being a human, understands human values and purpose of education
		Induction	CO2	Understands the importance of different harmony levels needed. Understand Self and being in the current moment are the sources of happiness.
	9HC18	Induction Drag argument	CO3	Improves Learning capabilities and communication skills.
		Program	CO4	Improves Personality Development and Life Skills
			CO5	Understands and appreciate the importance of personality development and yoga for a holistic life.
			CO6	Understands the essence and Values and Social responsibilities for successful life.

Year and	Course	Course name	Co's		
regulation	code				
			CO1	Differentiate the wave and particle, de-Broglie matter waves-its experimental evidence, Schroedinger's wave concept and its application for a particle in one dimension box.	
			CO2	Explain about emission, its types, laser principle, types, working and its applications and to reveals about TIR principle, optical fiber-types and signal propagation, attenuation, communication system and applications of optical fibers (sensors and medical endoscopy).	
	9HC07	Engineering	CO3	Classify magnetism types, Hysteresis, domain theory, Anti- ferro and ferri-magnetism, Superconductivity, experimental facts, theoretical analysis, types of superconductors and its applications.	
		Physics	CO4	Explain the basic concepts of dielectric materials, polarization and its types, local fields, frequency and temperature effect on dielectrics and their applications (piezo, ferro and Pyro electricity).	
I-II & A22			CO5	Elaborate semiconductor behavior, types, carrier concentration, Hall effect, Thermistor, demonstrate and analyze semiconductor devices like a PN-junction, I-V characteristics, LED, solar cell, photo diode and their applications.	
			CO6	Summarize nano& bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods (physical & chemical), analysis the techniques like XRD, SEM,	
	9EC01	Data Structures	CO1	Demonstrate the concepts of Abstract data type and also applications of stack and Queues	
			CO2	Select the data structure that efficiently model the information in a problem	
			CO3	Design programs using variety of data structures including Trees, AVL Trees and Graphs and their applications.	
			CO4	Solve problems and also assess efficiency trade off among searching and sorting using time complexity of each algorithm and also the applications of hashing and hash tables.	
			CO5	Describe the concepts of OOPs and implement programs using objects, classes, constructors and destructors.	
			CO6	Apply concepts of OOPs to write program on over loading functions and concepts of inheritance.	
		Advanced	CO1	Find the limits and test for the continuity and differentiability of a function.	
		Calculus	CO2	Solve the problems on multiple integrals.	
	9HC12		CO3	Solve linear and nonlinear first order partial differential equations.	
			CO4	Find Series expansion a function defined over the intervals. Find directional derivative, gradient, divergence and curl of	
			CO5	a function.	
			CO6	Solve higher order ordinary differential equations with	

				constant coefficients using come star land with a la
				constant coefficients using some standard methods.
		Basic Electrical	CO1	Understand the fundamentals of electrical engineering and DC machines.
		and Electronics	CO2	Understand the principles of AC circuits.
	9AC48	Engineering	CO3	Understand the principle and operation of three phase induction motor and measuring instruments.
	9AC48		CO4	Understand the principle and operation of diode.
			CO5	Understand the principle and operation of transistor.
			CO6	Understand the principles of digital electronics.
			CO1	Understand the nuances of striking a great conversation in formal and informal situations.
		Oral Communication	CO2	Gain experience of facing an audience and speaking in public.
	9HC62	Lab - II	CO3	Design a winning presentation and present it with ease.
			CO4	Understand the nuances of striking a great conversation in formal and informal situations.
			CO5	
			CO6	
			C01	Understand the concepts of photo electric effect
			CO2	Know about the light properties-dispersion
		Engineering Physics Lab	CO3	Recognize the difference between the interference and diffraction
	9HC66		CO4	Analyze the concepts of fiber optics
			CO5	Understand and search to apply the fundamentals of magnetic induction
			CO6	Know the difference between AC and DC fundamentals
			CO1	Implement Stacks, Queues and circular queues.
		Data Structures	CO2	Write programs using tree traversals. In-order, preorder and post-order.
	9EC61	using C Lab	CO3	Program searching, sorting and hashing operations.
		8	CO4	Write programs on Binary trees
		-	CO5	Implement classes and operator overloading.
		Engineering	CO1	Get familiar to use the instruments to solve the engineering problem and draw various type of curves used in engineering
		Graphics	CO2	Understand and Implement Orthographic projections and draw projections of simple drawing entities such as points Lines, and Planes
	9BC01		CO3	Draw projections of different types of regular solids in various positions wrt principal planes of projection
			CO4	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.
			CO5	Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views
			CO6	Understand from basic sketching through 2D and 3-D solid modeling using computer aided design (CAD) software

Year and	Course code	Course name		Co's
regulation	coue			Understand and comprehend the fundamentals of IAVA its
			CO1	Understand and comprehend the fundamentals of JAVA, its Classes, and Objects and write simple programs using constructors.
			CO2	Write programs using inheritance, interface and packages.
	9EC02	Object Oriented Programming	CO3	Implement programs using Packages, I/O Stream and collections.
		through Java	CO4	Implement Exception handling and Multithreading.
		C	CO5	Design programs using AWT, Swings and develop applications using event handling.
			CO6	Develop applications using Applets and develop client server programs using networking concepts.
			CO1	Solve the random variable problems and probability distributions.
			CO2	Estimate the parameters and solve the problems using central limit theorem.
	9HC15	Probability and Statistics	CO3	Test the hypothesis related to samples concerning to the means and proportions of large size samples.
	Jiiele	Statistics	CO4	Apply and solve the problems using t-test, Chi-square test also testing the hypothesis problems on small size samples, goodness of fit and independence of attributes.
			CO5	Solve the problems on measures of central tendency, Correlation
			CO6	Classify and differentiate various regression models
II-I & A22		Quantitative	CO1	Number system, HCF and LCM, Averages, Ages and ratio and proportion.
		Aptitude and	CO2	Various important topics of quantative aptitude.
	9HC16	Logical Reasoning	CO3	Mensuration and data interpretation topics.
			CO4	Series Completion, analogy, classification and coding and decoding topics.
			CO5	Various topics of logical reasoning.
			CO6	Venn-diagrams, cubes and dice and also on clocks and calendar problems.
			CO1	Select Python versions and mention their specifications.
		Python	CO2	Build programs using primitive data types.
		Programming	a	Design applications that include functions, modules,
	9FC02		CO3	packages along with respective exceptional handling
	71 C02		CO4	mechanism.
			CO4 CO5	Design applications using OO features of Python Write applications using Files.
			CO5	Make use of NumPy/Tkinter/Plotpy modules in applications.
				Evaluate elementary mathematical arguments and identify
	9F303		CO1	fallacious reasoning (not just fallacious conclusions).
			CO2	Reason about arguments represented in Predicate logic.

		Discrete		Perform operations on discrete structures such as sets,
		Mathematics	CO3	functions, relations, and sequences.
		Wathematics		Solve discrete mathematics problems that involve:
			CO4	computing permutations and combinations of a set.
			COF	Analyze and deduce problems involving recurrence relations
			CO5	and generating functions.
				Apply graph theory models of data structures and state
			CO6	machines to solve problems of connectivity and constraint
				satisfaction, for example, scheduling.
				Development of a holistic perspective based on self-
			CO1	exploration about themselves (human being), family, society
				and nature/existence.
940	203	Universal Human Values	CO2	Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
			CO3	Strengthening of self-reflection.
			CO4	Development of commitment and courage to act.
			CO5	
			CO6	
			CO1	Write programs to generate Prime numbers, Roots of quadratic equation and Fibonacci series.
		Object Oriented Programming through Java Lab	CO2	Write small application such as banking system.
91	EC62		CO3	Write programs on operator, function overloading and dynamic method dispatch.
		unough suvu Euo	CO4	Write programs to implement interface and packages.
			CO5	Explain and write programs to implement threads.
			CO6	Write programs to implement applets and event handling.
		Python	CO1	Install and run the Python interpreter
9	9LC61	Programming	CO2	Apply the best features of mathematics
		Lab and IT	CO3	Describe the Numbers
		workshop	CO4	Understand operations and summarize different File handling
			CO1	Examine the performance of DC machines and AC Machines. (L4)
		Basic Electrical	CO2	Illustrate the principles circuit theorems. (L2)
94	4C95	and Electronics	CO3	Examine the principle of operation of diode and its applications. (L4)
			CO4	Analyze the principle of operation of transistor. (L4) Develop the principles of Verification of Logic gates.
		Engineering Lab		(L3) Examine the performance of DC machines and AC Machines. (L4)
			CO5	Illustrate the principles circuit theorems. (L2)
			CO6	Examine the principle of operation of diode and its applications. (L4)

Year and regulation	Course code	Course name	Co's		
regulation			CO1	Perceive basic operational concept of computer and data processing.	
		Computer	CO2	Use data types with instruction set of specified architecture	
	9CC56	Computer Organization and	CO3	Justify different control unit design and algorithms for various operations.	
		Architecture	CO4	Elaborate basic architecture of 8086 processor	
			CO5	Write assembly language programming and debug to 8086	
			CO6	Interface devices to 8086 processor.	
			CO1	Comprehend importance, significance, models, Database languages, architecture and design of Data Base Systems.	
		Database	CO2	Design Relational Models and apply Integrity Constraints, Querying fundamentals, Logical data base Design and Views of databases along with application of Relational Algebra.	
	9FC04	Management Systems	CO3	Apply queries in SQL Query using Nested Queries Set, Comparison Operators, Aggregative Operators, Logical connectivity's with Joins statements and develop applications.	
			CO4	Eliminate data redundancy through normal forms.	
			CO5	Ensure ACID properties and Serializability in Transaction management and Database Recovery.	
			CO6	Use different External Storage Organization techniques and apply Indexing in databases to enhance system performance.	
	9EC16		CO1	At the end of this course, the student will be able to	
II-II & A22			CO2	Learn about various data types, types of data sets a data quality	
		Introduction to Data Science	CO3	Implementation of R fundamentals and perform factors and data frames.	
		Data Science	CO4	Implementation of data structures iterative programming & function concepts using R	
			CO5	Learn about data visualization techniques and apply suitable visualization techniques	
			CO6	Learn about dimensionality reduction based on examples illustrations	
			CO1	Analyze worst-case running times of algorithms using asymptotic analysis.	
		Design and Analysis of	CO2	Synthesize divide and-conquer algorithms. Derive and solve recurrences describing the performance of divide-and- conquer algorithms.	
	9FC05	Algorithms	CO3	Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.	
			CO4	Comprehend the concept of dynamic programming algorithms, their applications and analyze them.	
			CO5	Analyze the Backtracking and Branch and Bound algorithms and also identify the scenarios for its applicability.	
			CO6	Comprehend the concept of P and NP Problems and its usage in the applications.	
	9ZC01		CO1	To understand the nuances of Business and its relation to	

				economics
		Business Economics And	CO2	To understand the production function and cost concepts
		Financial Analysis	CO3	To learn the basic market structures and their relevance to business
			CO4	To learn the fundamentals of financial accounting concepts
			CO5	To apply the fundamental concepts of financial accounting in preparation of financial statements.
			CO6	To understand the financial ratios that are used to analyze the financial performance of the company.
			CO1	Understand about ecosystem and energy flow among the organisms.
		Environmental	CO2	Know the resources available, use of them and overexploitation of the resources in the nature.
	9HC05	Science	CO3	Learn the value, use and value of biodiversity.
	90003	Science	CO4	Understand the causes and effect of pollution and implement measures in control of pollution.
			CO5	Understand the sustainable development and implement green technology for sustainable development.
			CO6	Learn and implement policy to protect the environment.
	9HC63	Soft Skills Lab	CO1	Determine the significance of soft skills in the working environment
			CO2	Understand how to demonstrate empathy in a wide range of situations.
			CO3	Effectively communicate through verbal/oral communication and improve the listening
			CO4	Become more effective individual through goal/target setting, self-motivation and practicing creative thinking.
			CO5	Develop a positive and responsible attitude to their own well-being
			CO6	
		R Programming	C01	Understand basic terms what Statistical Inference means. Identify probability distributions commonly used as foundations for statistical modeling. Fit a model to data
		Lab and Design and Analysis of Algorithms Lab	CO2	CO-2: Discuss the significance of exploratory data analysis (EDA) in data science and to apply basic tools (plots, graphs, summary statistics) to carry out EDA
	9LC62	Algorithinis Lab	CO3	CO-3: Apply basic machine learning algorithms and to identify common approaches used for Feature Generation
			CO4	CO-4: Analyze fundamental mathematical and algorithmic ingredients that constitute a Recommendation Engine and to Build their own recommendation system using existing components
			CO5	
			CO6	
			CO1	Create tables and apply constraints.
	9FC63	Database Management	CO2	Write Queries using Aggregate functions, Conversion functions and use string functions
		Systems Lab	CO3 CO4	Explain and write PL/SQL programs using exceptions. Develop programs using loops, exceptions and write
L	1	1	007	E Programs using 100ps, exceptions and write

			Procedures.
		CO5	Write Programs for stored functions, invoke functions in
		COS	SQL Statement.
		CO6	Describe and write programs using features of
		000	CURSORs and its variables.
9CC83	Computer	CO1	Familiarize the architecture of 8086 processor, assembling
	Organization Lab		language programming and interfacing with various modules.
		CO2	Experiment with Arithmetic operations of binary number system.
		CO3	Simulate any type of VLSI, embedded systems, industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.
		CO4	Familiarize the architecture of 8086 processor, assembling language programming and interfacing with various modules.
		CO5	
		CO6	
9L484	Technical Seminar	CO1	Identify current general, political and technology related topics.
	~	CO2	Arrange and present seminar in a effective manner
		CO3	Collect, survey and organize content in presentable manner
		CO4	Demonstrate oratory skills with the aid of Power Point Presentations
		CO5	Exhibit interview facing skills and team leading qualities
		CO6	

Year and regulation	Course code	Course name		Co's
		BASICS OF ENTREPRENEURSHIP Open Elective-I	CO1	The students will acquire basic knowledge on Skills of Entrepreneurship.
			CO2	The students will understand the techniques of selecting the customers through the process of customer segmentation and Targeting
	07.000		CO3	The students understand business Models and their validity.
	9ZC22		CO4	The students understand the basic cost structure, Revenue Streams and the pricing strategies.
			CO5	The students will acquire knowledge about the project management and its techniques.
			CO6	The students get exposure on marketing strategies and business regulations for the Start up.
		SOFTWARE	CO1	Describe concepts of software testing.
		TESTING	CO2	Describe and apply the concepts Flow graphs, Path

		METHODOLOGIES		testing and Data Flow Testing.
		Professional Elective	CO3	Practice Software testing strategy and Environment with economics and apply Software Metrics useful in software development and maintenance.
III-I & A22			CO4	Software Testing Methodology, finding defects hard to find, Verification and validation, Functional and structural, Workbench concept, Eight Consideration of software testing methodology, checklist. Describe Agile computing with agile testing.
			CO5	Demonstrate Software Testing Techniques such as JADs, Pareto Analysis, Regression Tasting, Structured walkthroughs, Thread testing, Performance testing and White box testing.
			CO6	Describe Graph matrices and applications, and practice and apply automated testing tools such load Runner, UFT and QTP.
			CO1	Understand the functionality of the various data mining functions.
			CO2	Apply pre-processing techniques on various datasets.
	05005	Data Warehousing and Data Mining	CO3	Build a Data warehouse system and perform business analysis with OLAP tools.
	9FC05		CO4	Characterize the kinds of patterns that can be discovered by association rule mining.
			CO5	Compare and contrast between different classification and clustering algorithms.
			CO6	
			CO1	Students can able to identify software processes and software engineering practices to select and justify approaches for a given project and its constraints and distinguish lifecycles for developing software products.
			CO2	Students can able to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).
	9EC03	Software Engineering	CO3	Students understand the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving.
			CO4	Students can define and design models for the requirements stated in the baseline document.
			CO5	Students can able to understand and experience the testing process in improving the quality of the product by using software testing techniques/tools.
			CO6	
	9LC01	Introduction to Artificial Intelligence	CO1	Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.
			CO2	Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.
			CO3	Learn different knowledge representation techniques.
			CO4	Understand the concepts of state space representation,

9EC05         Computer Networks         COI         Identify the different types of network togologies and process in Network-analyze Supervised Learning vs. Learning Decision Trees.           9EC05         Computer Networks         COI         Identify the different types of network togologies and process in Network-analyze Supervised Learning vs. Learning Decision Trees.           9EC05         Computer Networks         COI         Identify the different types of network togologies and protocols useful for real time applications and transmission media.           CO2         Discuss design issues of data link layer and solve problems on Checksam and flow control.         CO3           CO3         Analyze MAC layer protocols and LAN technologies.         Obtain the skills of submething, routing mechanisms and concepts. services and protocols of Transport and Application layers along with the network security.           CO6         Understand the functional architecture of an Operating Systems.         Operating Systems of Decallock and illustrate the concepts of Decallock and illustrate the concepts of Decallock and illustrate the concepts of Memory Management. Algorithms, summarize the aspects of I/O Systems.           9EC06         Software Engineering Lab and Computer Networks Lab         Students can able to identify software process and software project. Software project on the concepts of Pile System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems.           9EC04         Software Engineering Lab and Computer Networks Lab         Students can able to identify software project. Software proje		1		I	1 1
9EC05         Computer Networks         COS COG         Computer network topologies and protocols useful for real time applications and robusine problems on Checksum and flow control.           9EC05         Computer Networks         COI         Identify the different types of network topologies and transmission media.           CO2         Discuss design issues of data link layer and solve problems on Checksum and flow control.         COI           CO3         Anulyze MAC layer protocols and flow control.         COI           CO4         Obtain the skills of subnetting, routing mechanisms and congestion control.         Discuss the concepts, services and protocols of transport and Application layers along with the network security           Operating Systems         COI         Understand the functional architecture of an Operating System.           9EC06         COI         Understand the functional architecture of transport and Application layers such system calls.           Analyze various process scheduling algorithms & pragmatics of scheduling algorithms & pragmatics of scheduling system.         Solver issues related to process synchronization and Inter process Communication (IPC) in the Operating System.           9EC06         Software Engineering Lab and Computer Networks Lab         COI         Students can able to identify software process and software engineering practices to solect and justices and to relate UML paradigm for problem software product.           9LC63         Students can able to identify software process and software engineering practices to					6
9EC05         Computer Networks         CO5         und Bayesian Networks analyze Supervised Learning vs. Learning Decision Trees.           9EC05         Computer Networks         CO1         Identify the different types of network topologies and protocols useful for real time applications and transmission media.           0202         Discuss design issues of duta link layer and solve problems on Checkum and flow control.         CO1           031         Analyze MAC layer protocols and LAN technologies.           042         Obtain the skills of subnetting, routing mechanisms and congestion control.           050         Discuss the concepts, services and protocols of Transport and Application layers along with the network security           040         Operating Systems         CO1         Understand the functional architecture of an Operating System.           0500         Operating Systems         CO2         Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.           0500         Co3         Software Engineering Lab and Computer Networks Lab         Co1         Software engineering practices to select and justify aproaches for a given project.         Sudents can able to identify workare process and software engineering practices to select and justify aproaches for a given project.           9LC63         Students can able to identify undels for the requirements stated in the software project.           9LC64         Artificial Intelligence tab and Data M					
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9EC05         Computer Networks         Coll         Identify the different types of network topologies and protocols useful for real time applications and utransmission media.           9EC05         Computer Networks         Coll         Discuss design issues of data link layer and solve problems on Checksum and flow control.           00         Coll         Coll         Discuss design issues of data link layer and solve problems on Checksum and flow control.           00         Coll         Coll         Obtain the skills of subnetting, routing mechanisms and congestion control.           01         Discuss the concepts, services and protocols of Transport and Application layers along with the network security.           00         Coll         Understand the functional architecture of an Operating System with usage of system calls.           00         Coll         Understand the functional architecture of an Operating System.           00         Coll         Coll         Analyze various process scheduling algorithms used by various Operating Systems.           9EC06         Coll         Coll         Coll the process of Deadlock and illustrate the concepts of Deadlock and illustrate the concepts of Deadlock and illustrate the concepts of Lab and Computer Networks Lab           9EC03         Software Engineering Lab and Computer Networks Lab         Explain the concepts of relie System with regard to Directory and Disk Management Algorithms, summarize the aspects of L/O Systems. Protection and Security.				CO5	
9EC05         Computer Networks         Coll         Identify the different types of network topologies and protocols useful for real time applications and transmission media.           9EC05         Computer Networks         Discuss design issues of data link layer and solve problems on Checksum and flow control.           C03         Analyze MAC layer protocols and LAN technologies.           C04         Obtain the skills of subnetting, routing mechanisms and congestion control.           C05         Discuss the concepts, services and protocols of Transport and Application layers along with the network security           C06         Understand the functional architecture of an Operating System with usage of system calls.           Analyze various process scheduling algorithms used by various Operating Systems.         Solve issues related to process synchronization and littler process (Communication (IPC) in the Operating System.           9EC06         C04         Congreting System         Coortice operating System with regard to Directory and Disk Management.           Explain the concepts of File System with regard to Directory and Disk Management.         Explain the concepts of and principles of I/O Systems, Protection and Security.           9LC63         Software Engineering Lab and Computer Networks Lab         Students can able to identify software process and software engineering notation indesign models for the requirements stated in the software project.           9LC63         Artificial Intelligence Lab and Computer Networks Lab         Students can deline an					Learning Decision Trees.
9EC05       Computer Networks       CO1       protocols useful for freat time applications and transmission media.         9EC05       Computer Networks       CO2       Discuss design issues of data link layer and solve problems on Checksum and Intow control.         CO3       Analyze MAC layer protocols and LAN technologies.       Obtain the skills of subnetting, routing mechanisms and concepts, services and protocols of Transport and Application layers along with the network security.         CO6       Understand the functional architecture of an Operating System with usage of system calls.         Operating Systems       CO1       Understand the functional architecture of an Operating Systems.         SO       CO3       Analyze various process scheduling algorithms used by various Operating Systems.         SOE06       CO3       Inter process Communication (IPC) in the Operating System.         CO6       CO4       Understand the concepts of Deadlock and System.         CO6       CO4       Explain the concepts of File System with lagerithms suggerithms, summarize the aspects of I/O Systems, Protection and Security.         Software Engineering Lab and Computer Networks Lab       Sudents can able to identify software process and software ongineering practices to select and justify use strong process of anging protocols for the requirements stated in the software project.         Software Engineering Lab and Computer Networks Lab       Students can able to identify software process and software ongineering practices to select and justify us				CO6	
9EC05         Computer Networks         CO2 Problems on Checksum and How control. <sup>1</sup> 9EC05         CO3 Analyze MAC layer protocols and LAN technologies. CO4 Obtain the skills of subnetting, routing mechanisms and congestion control. CO5 Transport and Application layers along with the network security           0         Operating Systems         CO6 CO5         Understand the functional architecture of an Operating System with usage of system calls. Analyze various process scheduling algorithms used by various Operating Systems.           9EC06         Co1 Operating Systems         Co1 Operating Systems. CO2         Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.           9EC06         Co3 Solve issues related to process of Memory Management.         Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.           9LC63         Software Engineering Lab and Computer Networks Lab         CO6 CO2         Students can able to identify software process and distinguish life cycles long design models for the reguirements stated in the software project.           9LC63         Artificial Intelligence Lab and Data Mining         Co3 Analyze MAC layer protocols and LAN technologies. Apply basic principles of AI in solutions that require problems on Checksum and low control.				CO1	protocols useful for real time applications and transmission media.
Operating Systems         CO3         Analyze MAC layer protocols and LAN technologies.           C04         Obtain the skills of subnetting, routing mechanisms and congestion control.         Discuss the concepts, services and protocols of CO5           C05         Transport and Application layers along with the network security         CO6           C06         Understand the functional architecture of an Operating System setup various process scheduling algorithms used by various Operating Systems.           9EC06         CO1         Understand the concepts of process synchronization and Inter process Communication (IPC) in the Operating System.           9EC06         CO3         Solve issues related to process of Memory Management.           Software Engineering Lab and Computer Networks Lab         CO4         Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and software engineering and project and its constraints and software engineering and project and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for proloem solving.           9LC63         Sudents can able to identify software project.         Sudents can able to seign cand, software to concels.           9LC64         Artificial Intelligence Lab and Data Mining         CO1         Sudents can able to seign candel LAN technologies.           9LC64         Artificial Intelligence         CO1         Sudents can able to significance.		9EC05	Computer Networks	CO2	
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9EC06         CO5         Transport and Application layers along with the network security           9EC06         CO1         Understand the functional architecture of an Operating System with usage of system calls.           9EC06         CO1         Understand the functional architecture of an Operating System vibus process scheduling algorithms used by various Operating Systems.           9EC06         CO1         Understand the functional architecture of an Operating System.           9EC06         CO2         Kaptage process communication (IPC) in the Operating System.           9EC06         CO3         Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.           Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.           CO2         CO2           9LC63         Software Engineering Lab and Computer Networks Lab           9LC64         Artificial Intelligence Lab and Data Mining           0Lc64         Artificial Intelligence Lab and Data Mining           0Lc64         Artificial Intelligence Lab and Data Mining				CO4	Obtain the skills of subnetting, routing mechanisms and congestion control.
9EC06         Col         Understand the functional architecture of an Operating Systems           9EC06         Analyze various process scheduling algorithms & pragmatics of scheduling algorithms used by various Operating Systems.           9EC06         Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.           9EC06         Cot         Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.           Cot         Comprehend the concepts of Memory Management.         Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.           Software Engineering Lab and Computer Networks Lab         Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.           Sudents can able to identify software product.         Students can able to identify software product.           9LC63         Students can able to identify soly and process and software angineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing soltware product.           9LC64         Artificial Intelligence Lab and Data Mining         Students can able to design class, object and interactive diagrams and know their significance.           9LC64         Artificial Intelligence Lab and Data Mining         Cot         Apply basic principles of				CO5	Transport and Application layers along with the network
Operating Systems         CO1         Operating System vith usage of system calls.           9EC06         Analyze various process scheduling algorithms used by various Operating Systems.           9EC06         Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.           9EC06         CO4         Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.           Explain the concepts of File System with regard to Directory and Disk Management.         Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.           CO6         Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.           9LC63         CO3         Students can define and design models for the requirements stated in the software project.           9LC64         Artificial Intelligence Lab and Data Mining Lab and Data Mining Lab and Data Mining         CO4         Analyze MAC layer protocols and LAN technologies. Apply basic principles of AI in solutions that require motion. Rowledge representation, and learning.				CO6	
9EC06       Operating Systems       Analyze various process scheduling algorithms used by various Operating Systems.         9EC06       Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.         9EC06       Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.         Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.         9LC63       Software Engineering Lab and Computer Networks Lab         9LC64       Artificial Intelligence Lab and Data Mining Lab and Data Mining Lab and Data Mining         9LC64       Artificial Intelligence         9LC64       Artificial Intelligence         1       Col         1       Artificial Intelligence         1       Col         1       Artificial Intelligence         1       Col         2       Artificial Intelligence         1       Col         3       Artificial Intelligence         1       Col         3       Artificial Intelligence <td< td=""><td></td><td></td><td></td><td>CO1</td><td></td></td<>				CO1	
9EC06       CO2       & pragmatics of scheduling algorithms used by various Operating Systems.         9EC06       Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.         CO3       Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.         CO4       Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.         CO6       Co6         9LC63       Software Engineering Lab and Computer Networks Lab         9LC63       CO3         9LC64       Artificial Intelligence Lab and Data Mining         9LC64       Artificial Intelligence Lab and Data Mining         9LC64       Artificial Intelligence Lab and Data Mining         CO4       Exploain solving, knowledge representation, and learning.			Operating Systems		
9EC06       Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.         9EC06       CO3       Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.         9EC06       CO4       CO4       CO4         C04       illustrate the concepts of Deadlock and illustrate the concepts of Memory Management.         C05       Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.         C06       C01       Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.         9LC63       C04       Students can able to identify software process and software project.         9LC63       C05       Students can able to identify software product.         9LC64       Artificial Intelligence Lab and Data Mining       C06         9LC64       Artificial Intelligence Lab and Data Mining       C01         9LC64       Artificial Intelligence Lab and Data Mining       C01				CO2	
9EC06       CO3       Solve issues related to process synchronization and Inter process Communication (IPC) in the Operating System.         9EC06       CO3       Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.         CO4       Explain the concepts of File System with regard to Directory and Disk Management.         CO5       Software Engineering Lab and Computer Networks Lab       CO1         9LC63       Software Engineering Lab and Computer Networks Lab       CO2         9LC63       CO3       Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.         Sudents can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.         Sudents understand the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving.         Students can able to design class, object and interactive diagrams and know their significance.         CO4       Students can able to design class, object and interactive diagrams and know their significance.         CO4       CO6         Students can define and flow control.       CO6         CO4       Students can able to design class, object and interactive diagrams and know their significance.				002	
9EC06       CO3       and Inter process Communication (IPC) in the Operating System.         9EC06       CO4       Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.         CO5       Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.         CO6       CO6         9LC63       Software Engineering Lab and Computer Networks Lab         9LC63       CO3         9LC64       Artificial Intelligence Lab and Data Mining 9LC64         Artificial Intelligence Lab and Data Mining       CO1         PLC64       Artificial Intelligence Lab and Data Mining         CO6       CO1         PLC64       Artificial Intelligence Lab and Data Mining         CO6       CO4					1 0 0
9EC06       Operating System.         9EC06       Comprehend the concepts of Deadlock and illustrate the concepts of Memory Management.         CO4       Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.         CO6       CO6         9LC63       Software Engineering Lab and Computer Networks Lab       CO1         9LC63       Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.         9LC64       Artificial Intelligence Lab and Data Mining       CO1         9LC64       Artificial Intelligence Lab and Data Mining       CO1				CO3	
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9LC63       CO4       illustrate the concepts of Memory Management.         9LC64       Software Engineering Lab and Computer Networks Lab       CO1       Explain the concepts of File System with regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.         9LC63       Software Engineering Lab and Computer Networks Lab       CO1       Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.         CO2       Students can define and design models for the requirements stated in the software project.         CO4       Students can able to design class, object and interactive diagrams and know their significance.         CO5       Discuss design issues of data link layer and solve problems on Checksum and flow control.         CO6       CO6         9LC64       Artificial Intelligence Lab and Data Mining       CO1         9LC64       Artificial Intelligence Lab and Data Mining       CO1         9LC64       Artificial Intelligence Lab and Data Mining       CO1		9EC00		CO4	
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9LC63Artificial Intelligence Lab and Data MiningCO5regard to Directory and Disk Management Algorithms, summarize the aspects of I/O Systems, Protection and Security.9LC64Artificial Intelligence Lab and Data MiningCO6Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.9LC64Artificial Intelligence Lab and Data MiningCO69LC64Artificial Intelligence Lab and Data MiningCO19LC64Artificial Intelligence Lab and Data MiningCO10CO1Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.					
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9LC63       Artificial Intelligence         9LC64       Artificial Intelligence         1       C01				CO5	
9LC63       CO6       CO6         9LC64       Artificial Intelligence Lab and Data Mining       Artificial Intelligence Lab and Data Mining       CO1       Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.         9LC63       Students understand the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving.         9LC64       CO4       Students can able to design class, object and interactive diagrams and know their significance.         9LC64       Artificial Intelligence Lab and Data Mining Lab       CO1       Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.				005	Algorithms, summarize the aspects of I/O
9LC63       CO6       CO6         9LC64       Artificial Intelligence Lab and Data Mining       Artificial Intelligence Lab and Data Mining       CO1       Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.         9LC63       Students understand the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving.         9LC64       CO4       Students can able to design class, object and interactive diagrams and know their significance.         9LC64       Artificial Intelligence Lab and Data Mining Lab       CO1       Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.					Systems, Protection and Security.
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9LC63       CO3       Students can define and design models for the requirements stated in the software project.         CO4       Students can able to design class, object and interactive diagrams and know their significance.         CO5       Discuss design issues of data link layer and solve problems on Checksum and flow control.         CO6       Analyze MAC layer protocols and LAN technologies.         9LC64       Artificial Intelligence Lab and Data Mining Lab         Vertice       CO1         Poblem solving, knowledge representation, and learning.				CO2	Students understand the importance and principles of Unified Modeling Language, its building blocks and to
9LC64     Artificial Intelligence Lab and Data Mining     CO4     diagrams and know their significance.       9LC64     Artificial Intelligence Lab and Data Mining     CO1     Discuss design issues of data link layer and solve problems on Checksum and flow control.       9LC64     Artificial Intelligence Lab and Data Mining     CO1     Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.		91063		CO3	Students can define and design models for the
9LC64     Artificial Intelligence Lab and Data Mining     CO5     problems on Checksum and flow control.       9LC64     Artificial Intelligence Lab and Data Mining     CO1     Apply basic principles of AI in solutions that require problem solving, knowledge representation, and learning.				CO4	diagrams and know their significance.
9LC64 Artificial Intelligence Lab and Data Mining Lab					problems on Checksum and flow control.
9LC64 Artificial Interligence Lab and Data Mining Lab				CO6	
		9LC64	Lab and Data Mining	CO1	problem solving, knowledge representation, and
			Lab	CO2	Apply pre-processing statistical methods for any given

				raw data.
			CO3	Gain practical experience of constructing a data warehouse.
			CO4	Implement various algorithms for data mining in order to discover interesting patterns from large amounts of data.
			CO5	Apply OLAP operations on data cube construction.
			CO6	
			CO1	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
	9L591 Summer Industry Internship -I	CO2	Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.	
		Internship -I	CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
			CO4	Improve their communicative skills and team skills.
			CO5	
			CO6	
	ECONOMY	BASICS OF INDIAN	CO1	Describe the new dimensions and products served by the banking system in INDIA.
			CO2	Explain the credit control system and create awareness on NPA's
		(Open Elective –I)	CO3	Apply the knowledge of Insurance concepts in real life scenarios
			CO4	Recognize the importance of regulatory and legal frame work of IRDA
			CO5	Identify the risk management process and methods.
			CO6	Calculate the diversity of risk and return.

		CO1	Understand the Additive manufacturing processes and their relationship with subtractive manufacturing.
	INTRODUCTION TO ADDITIVE MANUFACTURING PROCESS (Open Elective –I)	CO2	Demonstrate comprehensive knowledge of the broad range of liquid based rapid prototype processes, devices, capabilities and materials that are available.
		CO3	Apply the principles of casting in Additive manufacturing processes
9BC51		CO4	Articulate the various tradeoffs of Additive manufacturing software's/data format that must be made in selecting advanced/additive manufacturing processes, devices and materials to suit particular product requirements.
		CO5	Learn various applications of additive manufacturing, such as in architecture art, health care direct part production and mass customization.
		CO6	

		CO1	Describe concepts of software testing.
		CO2	Describe and apply the concepts Flow graphs, Path testing and Data Flow Testing.
		CO3	Practice Software testing strategy and Environment with economics and apply Software Metrics useful in software development and maintenance.
9LC11	SOFTWARE TESTING METHODOLOGIES (Professional	CO4	Software Testing Methodology, finding defects hard to find, Verification and validation, Functional and structural, Workbench concept, Eight Consideration of software testing methodology, checklist. Describe Agile computing with agile testing.
	Elective-I)	CO5	Demonstrate Software Testing Techniques such as JADs, Pareto Analysis, Regression Tasting, Structured walkthroughs, Thread testing, Performance testing and White box testing.
			Describe Graph matrices and applications, and practice
		CO6	and apply automated testing tools such load Runner, UFT and QTP
		CO1	Gain the knowledge on the inputs required for design thinking and also gain familiarity on concepts related to design thinking.
		CO2	Understand the techniques of idea generation
		CO3	Classify different phases of design thinking
	DESIGN THINKING	CO4	Realize the product design process.
9LC13	(Professional Elective	CO5	Understand design thinking for service design.
JLC15	-I)	CO6	Gain knowledge on various case studies related to design thinking.
	HUMAN	CO1	Explain role of user Interface
COMPUTER	CO2	Describe the concept of direct manipulation	
9FC10	INTERACTION	CO3	Describe Human interaction with computers
	(Professional	CO4	Apply and explain Screen Designing formalities such as Screen planning
	Elective-I)	CO5	Explain Windows–Navigation schemes and screen based controls. Apply Components – text and messages
		CO6	Develop applications with the aid of Software tools

Year and regulation	Course code	Course name		Co's	
			CO1	Understand the most common type of security attacks.	
			CO2	Understand the Encryption Principles, public key cryptography and algorithms.	
	9EC09	CRYPTOGRAPHY AND NETWORK SECURITY (Professional Elective –II)	CO3	Understand security protocols for protecting data on networks.	
			CO4	Be able to digitally sign emails and files.	
			CO5	Understand vulnerability assessments and the weakness of using passwords for authentication	
			CO6	Understand the most common type of security attacks.	
		SOFTWARE PROJECT MANAGEMENT	CO1	Explain primitives of Project Planning and evolution	
	9FC13		COI	of software economics.	
		(Professional Elective –II)	CO2	Describe software economics; reduce Software product size, improvement in software processes, improving	

				team effectiveness, improving automation, Achieving
			CO3	quality.Explain Life cycle phases and Artifacts of the process.
				Describe Model based software architectures and
			CO4	Work Flows.
			CO5	Apply Checkpoints for a process such as Major mile stones, Minor Milestones and apply work breakdown structures for a iterative process within cost and schedule. Describe Project Organizations and Responsibilities.
III-II & A22			CO6	Describe Automation and Project Control and Process instrumentation and explain Future Software Project Management such as Modern Project Profiles and Next generation project management.
			CO1	Ability to apply IR principles to locate relevant information large collections of data
		INFORMATION	CO2	Ability to design different document clustering algorithms
	9FC08	RETRIEVAL	CO3	Implement retrieval systems for web search tasks.
		SYSTEMS	CO4	Design an Information Retrieval System
		(Professional Elective –II)	CO5	
		(	CO6	
			CO1	Getting familiar with terminology, technology and applications of IOT
	9IC45	INTRODUCTION TO INTERNET OF THINGS (Professional Elective –II)	CO2	Understand and explain IoT system management using M2M (machine to machine) with necessary protocols
			CO3	Design and develop Python Scripting Language programs preferred for many IoT applications
			CO4	Use Raspberry PI as a hardware platform for designing the IoT sensor interfacing
			CO5	Implement web based services for IoT
			CO6	Understand and analyze the case studies illustrating IoT Design
			CO1	Understand the principles of HDFS and digital signature.
			CO2	Explore the block chain Technology, Simplified Payment Verification protocol and its life cycle.
	9JC05	BLOCKCHAIN TECHNOLOGIES	CO3	Analyze the Nakamoto consensus and differentiate proof-of-work and proof-of-stake consensus algorithms.
		(Professional Elective –	CO4	Understand the working of crypto currency, Bitcoin and Ethereum.
		III)	CO5	Explore Applications on legal issues of block chain.
			CO6	Explore new trends in block chain technologies.
			CO1	Understand various stages and phases of software projects.
		UNIFIED MODELING	CO2	Select the basic elements of modeling such as Things, Relationships and Diagrams

	9LC16	LANGUAGE		depending on the views of UML Architecture
		(Professional Elective –		and SDLC.
		III)		Design class and object diagrams that
			CO3	represent static aspects of a software system.
				Design component and deployment diagrams
			CO4	for software systems.
				Design activity and state chart diagrams for
			CO5	software systems.
			CO6	
			CO1	Understand the fundamentals of Virtual Reality.
				Analyze multiple Models of Input and Output Interface
		AUGMENTED	CO2	in Virtual Reality like Gloves, Video-based Input, 3D
	9LC08	REALITY AND		Menus & 3DScanner etc.
		VIRTUAL REALITY	CO3	Illustrate the fundamentals or advanced topics of Computer Graphics.
	9LC08	(Professional Elective –		Analyze the Interactive Techniques on VR in respect
		III)	CO4	of Body Track, Hand Gesture, 3D Manus, and Object
				Grasp.
			CO5	Understand the development tools of VR.
			CO6	Explore the Conceptual idea on Augmented Reality and relate the illustrations.
			CO1	Analyze general terminology of image processing.
		IMAGE PROCESSING (Professional Elective – )9 III)		Examine various types of images, intensity
	9FC09		CO2	transformations and spatial filtering.
			CO3	Develop Fourier transform for image processing in
			005	frequency domain.
			CO4	Evaluate the methodologies for image segmentation,
			CO5	restoration etc. Implement image process and analysis algorithms.
				Apply image processing algorithms in practical
			CO6	applications.
			CO1	Understand the fundamental concepts of ML and
		-	0.01	Designing a Learning System.
			CO2	Understand the basic concepts of linear models, tree and Probabilistic Models.
				Understand various Dimensionality Reduction
		MACHINE	CO3	Techniques and Apply Various, Evolutionary
	9LC03	LEARNING		Algorithms with models.
				Understand the Graphical models and
			CO4	Analytical Learning.
			~	
			CO5	
			CO6	
			CO1	Design the finite automata different
			002	Languages
			CO2	Construct finite Automata for a given regular
				expression, and derive strings with suitable
		COMPILER DESIGN		examples. Conceptualize context free
	9LC04		<u> </u>	grammars and normal forms.
			CO3	Design the push down automata and Turing
				Machine for complex languages.

			CO4	Understand LEX tool and relate parsing
				techniques,
			CO5	Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (O), LR(1), LR(K) grammar and use YACC tool.
			CO6	Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form.
			CO1	Demonstrate a breadth of knowledge in Intellectual property
			CO2	Overview of Patents, Searching, filling and drafting of Patents
		INTELLECTUAL	CO3	Overview of copyright & GI.
	9IC04	PROPERTY RIGHTS	CO4	Overview of Trade Mark & Trade Secret,
			CO5	Overview of Integrated Circuit and Industrial Design.
			CO6	
				Knowledge about different national and international: Conventions and Treaties, Governing the IPRs.
		WEB 5 TECHNOLOGIES	CO1	1. Demonstrate the use of HTML tags. Apply Styles using CSS and Bootstrap.
			CO2	2. Develop scripts using XML and validate using parsers.
	9FC06		CO3	3. Appraise the Expressions, Filters, Directives, Controller, and Modules of Angular.
			CO4	4. Design responsive web applications.
			CO5	5. Comprehend the uses of Web servers and design the server-side scripts using Servlets.
			CO6	6. Design and develop server-side scripts and components using PHP.
			CO1	Apply common Machine Learning algorithms in practice and implementing their own.
			CO2	Perform experiments in Machine Learning using real- world data.
		MACHIDIT	CO3	Implementation of DFA for a given Languages/ Regular Expression.
	9LC65	MACHINE LEARNING LAB	CO4	
		AND COMPILER	CO5	
		DESIGN LAB	CO6	
			CO1	Demonstrate the use of HTML tags and be able to design web pages. Develop dynamic programs involving Java scripts, popup windows in JavaScript along Event Handling.

9FC66	WEB TECHNOLOGIES LAB	CO2 CO3 CO4 CO5 CO6	Develop scripts using XML and XSLT and read XML documents using parsers, DOM parser, and SAX parser. Develop JSON files and access them via HTML pages. Implement Angular with Expressions, Filters, Directives, Controller, and Modules. Develop a Single Page Application with implementation of Scope and Form. Implement Java servlets using Apache Tomcat Server for User authentications Develop an application in PHP with Database connectivity.
9LC04	COMPREHENSIVE VIVA VOCE	CO1 CO2 CO3 CO4 CO5 CO6	Assessed the knowledge of the students in the Core and Elective subjects that they have studied till the completion of that academic year

Year and regulation	Course code	Course name		Co's
			CO1	Formulate and solve mathematical model (linear programming problem) for a physical situation like production, distribution of goods and economics.
		PRINCIPLES OF OPERATIONS	CO2	Recognize and Solve the problem of transportation involving a large number of shipping routes with least transportation cost and generate optimal assignment strategy for different situations
	9BC52	RESEARCH (Open Elective –II)	CO3	Use Johnson's rule to create the optimal sequencing schedule for a sequencing problem and make decisions about replacing an item using replacement policy
			CO4	Analyze the performance measures of Queing system and Calculate the EOQ for minimizing the total inventory cost
			CO5	Apply simulation techniques for solving various

				types of problems and general idea development
				about Markov chains
			CO6	
			CO1	Gain knowledge on the stages of Startup and the turbulence environment it undergoes and the stages related to growth of the Startup.
IV-I & A22		ADVANCED	CO2	Exposed to the various business models and critically evaluating the effectiveness of the business models and products
	9ZC23	ENTREPRENEURSHIP	CO3	Understand the method of business traction, create roles and build their A- team
		(Open Elective –II)	CO4	Understand the various channels of revenue building and exploration of new revenue avenues.
			CO5	Understand the need of sales planning and people plan and also financial modeling
			CO6	Exposed to the legal implications affecting the company's prospects and identifying right mentors and advisors to support startups
			CO1	Students will understand the nature of Entrepreneurship and its importance.
		ENTREPRENEURSHIP	CO2	Will gain knowledge regarding project, its life cycle and organization.
	9ZC19	PROJECT MANAGEMENT AND	CO3	Will gain knowledge relating to project formulation.
		STRUCTURED FINANCE	CO4	Comprehend the components of structured finance
		(Open Elective –II)	CO5	Establish a framework of CMBS
			CO6	Students will gain knowledge relating to the CRE Servicing
			CO1	Outline knowledge relating to the Indian Constitution and the Preamble to the Constitution.
			CO2	Relate to the fundamental rights and duties of the Indian citizens and the directive principles of state policy.
		BASICS OF POLITY AND ECOLOGY	CO3	Identify about the federal structure and judiciary of India.
	9ZC26	(Open Elective –II)	CO4	Understand knowledge relating to the conservation of the environment.
			CO5	Analyze about bio-diversity and climatic changes occurring in the environment.
			CO6	Discuss about the international treaties, conventions and organizations active in the field of environmental protection.
			CO1	Identify the differences between typical scripting languages and typical system and application programming languages.
	9FC77		CO2	Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.
		SCRIPTING LANGUAGES	CO3	Acquire programming skills in scripting languages.
		(Professional Elective –IV)	CO4	1 1 6 a month and ambandon
			CO5	
			C06	
			CO1	Understand various stages and phases of software projects.
			CO2	Select the basic elements of modeling
			002	screet the basic clements of modeling

9FC16     DEVELOPMENT (Professional Elective -IV)     Diagrams depending on the views of UML Architecture and SDLC.       0     Design class and object diagrams that represent static aspects of a software system.       0     Design activity and state chart diagrams for software systems.       0     Design activity and state chart diagrams for software systems.       0     Devops (Professional Elective -IV)     Coil       0     Identify components of Devops environment.       0     Devops (Professional Elective -IV)     Coil       0     Identify components of Devops environment.       0     Devops environment.       0     Describe Software development models and chicterus of DevOps.       0     Apply different project management, integration, testing and code deployment tool.       0     Coil     Investigate different DevOps Software development models.       0     Coil     Goil the knowledge of the use and availability of tools to support an chical hack.       0     Coil     Coil the knowledge of the use and availability of tools to support an chical hack.       0     Coil     Summarize the characteristics of cloud and different and imposed models and to explore words specific exrices.       0     Coil     Summarize the characteristics of cloud and different and nanzone cel instance through python programs, assess the performance of cloud services and summaria the innovative applications. Creat and namanage revices.       0					
9FC17     CLOUD COMPUTING (Professional Elective -IV) (Professional Elective -IV)     Content of the construction of the constructi		0EC16	AGILE SOFTWARE		such as Things, Relationships and
9FC17       CLOUD COMPUTING (Professional Elective -IV)       Construction of the stand of object diagrams that represent static aspects of a software system.         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Professional Elective -IV)       Design class and object diagrams for software systems.         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Professional Elective -IV)       Cost (Professional Elective -IV)         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Professional Elective -IV)       Cost (Professional Elective -IV)         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Professional Elective -IV)       Cost (Professional Elective -IV)         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Professional Elective -IV)       Cost (Professional Elective -IV)         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Professional Elective -IV)       Cost (Professional Elective -IV)         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Professional Elective -IV)       Cost (Professional Elective -IV)         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Professional Elective -IV)       Cost (Professional Elective -IV)         9FC17       CLOUD COMPUTING (Professional Elective -IV)       Cost (Cost (Professional Elective -IV)       Summarize the characteristics of cloud and different architectures of cloud and (Profess		96010			
9JC04       CO3       represent static aspects of a software system.         C04       Design component and deployment diagrams for software systems.       C05         C05       Design activity and state chart diagrams for software systems.       C06         C06       C01       Identify components of Devops environment.         C02       Describe Software development models and architectures of DevOps.         Apply different projects management, integration, testing and code deployment tool.       C01         C04       Devops and architectures of DevOps.         Apply different projects.       C06         C05       Assess various Devops practices.         C06       C01         Gain the knowledge of the use and availability of tools to support and the dangers associated with penetration testing.         C05       Gain the knowledge of a test.         C06       C01         Gain the knowledge of a test.       C04         C04       Comprehead the dangers associated with penetration testing.         C05       C06         Summarize the characteristics of cloud and different architectures for cloud.         C04       Design of test.         C05       Summarize the characteristics of cloud and different architecture of an Apps such as map reduce, image processing app et on cloud and understand various security aspects in cloud.					
9JC04       System.         9FC17       CLOUD COMPUTING (Professional Elective – IV)       Col       Summarize Summarize the characteristics of cloud and different architectures for cloud. Summarize the characteristics of cloud and different architectures for cloud. Col         9FC17       CLOUD COMPUTING (Professional Elective – IV)       Col       Summarize Summarize the characteristics of cloud and different architectures for cloud. Col         9FC17       CLOUD COMPUTING (Professional Elective – IV)       Col       Summarize Summarize the characteristics of cloud and different architecture for cloud. Col         9FC17       CLOUD COMPUTING (Professional Elective – IV)       Col       Summarize Summarize the characteristics of cloud and different architecture for cloud. Col         9FC17       CLOUD COMPUTING (Professional Elective – IV)       Col       Summarize the characteristics of cloud and differentiate the cloud service and deployment models and to explore vends security aspects in cloud. Col         9FC17       CLOUD COMPUTING (Professional Elective – V)       Col       Summarize the characteristics of cloud and different architecture of a Apps such as map reduce, image processing app et on cloud. Col         Col       Col       Col       Summarize the importance of business intcilligence and its applications in today's world.					
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9JC04     COS     Design activity and state chart diagrams for software systems.       COS     COS     COS       COS     Identify components of Devops environment.       DEVOPS (Professional Elective –IV)     CO2     Describe Software development models and architectures of DevOps.       Apply different project management, integration, testing and code deployment tool.     CO3     Apply different project management, integration, testing and code deployment tool.       CO4     Investigate different DevOps Software development models.     CO5       CO5     Assess various Devops practices.       CO6     Collaborate and adopt Devops in real- time projects.       CO3     Interpret the results of a controlled atack.       CO4     Interpret the results of a controlled atack.       CO5     CO6       CO4     Explain the role of inherent and imposed imitations and metrics for planning of a test.       CO6     CO6       CO6     Summarize the characteristics of cloud and differentiate the cloud service and deployment models and to explore vendor specific services of CO4 services and summarize the innovative applications (Create and run Amazon ec2 instance of cloud services and summarize the innovative applications of OT on cloud.       CO4     CO4       CO4     CO4       CO4     Code services and summarize the innovative applications of OT on cloud.       CO5     CO6       CO6     CO4				CO4	
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9JC04       ETHICAL HACKING (Professional Elective –IV)       CO1       Gain the knowledge of the use and availability of tools to support an ethical hack.         9JC04       ETHICAL HACKING (Professional Elective –IV)       CO2       Interpret the results of a controlled attack.         CO3       Explain the role of inherent and imposed limitations and metrics for planning of a test.       CO4       Comprehend the dangers associated with penetration testing.         CO5       CO6       CO6       Summarize the characteristics of cloud and differentiate the cloud service and deployment models and to explore vendor specific services         9FC17       CLOUD COMPUTING (Professional Elective – V)       CO2       Summarize the characteristics of cloud applications of IOT on cloud.         3.Design architecture of an Apps such as map reduce, image processing app et on cloud and understand various security aspects in cloud.       CO4         CO4       CO5       CO6         CO3       CO4       CO4				CO6	1 1
9JC04       ETHICAL HACKING (Professional Elective –IV)       C02       Interpret the results of a controlled attack.         9JC04       Explain the role of inherent and imposed limitations and metrics for planning of a test.       C03       Explain the role of inherent and imposed limitations and metrics for planning of a test.         C04       Comprehend the dangers associated with penetration testing.       C05         C05       C06         C06       Summarize the characteristics of cloud applications, Create and texplore vendor specific services         9FC17       CLOUD COMPUTING (Professional Elective – V)       Summarize the innovative applications, Create and run Amazon ec2 instance through python programs, assess the performance of cloud services and summarize the innovative applications of IOT on cloud.         C03       3.Design architecture of an Apps such as map reduce, image processing app et on cloud and understand various security aspects in cloud.         C04       C05         C05       C06         C06       C01				CO1	Gain the knowledge of the use and availability of
9JC04       (Professional Elective –IV)       CO3       Explain the role of inherent and imposed limitations and metrics for planning of a test.         CO4       Comprehend the dangers associated with penetration testing.       CO5         CO5       CO6         CO1       Summarize the characteristics of cloud and differentiate the cloud service and deployment models and to explore vendor specific services         9FC17       V)       CO2         PFC17       V)       CO3         CO4       Summarize the characteristics of cloud and differentiate the cloud service and deployment models and to explore vendor specific services         2.Analyze different architectures for cloud applications, Create and run Amazon ec2 instance affronce of cloud services and summarize the innovative applications of IOT on cloud.         CO3       3.Design architecture of an Apps such as map reduce, image processing app et on cloud and understand various security aspects in cloud.         CO4       CO4         CO5       CO6         CO4       CO4         CO5       CO6         CO6       CO4			ETHICAL HACKING	CO2	
9JC04       Imitations and metrics for planning of a test.         CO4       Comprehend the dangers associated with penetration testing.         CO5       CO6         CO6       Summarize the characteristics of cloud and differentiate the cloud service and deployment models and to explore vendor specific services         2.Analyze different architectures for cloud applications, Create and run Amazon ec2 instance through python programs, assess the performance of cloud services and summarize the innovative applications of IOT on cloud.         3.Design architecture of an Apps such as map reduce, image processing app etc on cloud and understand various security aspects in cloud.         CO4       CO5         CO6       CO4         CO3       CO4         CO4       CO5         CO6       CO6					Explain the role of inherent and imposed
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3.Design architecture of an Apps such as map reduce, image processing app etc on cloud and understand various security aspects in cloud.         CO4         CO5         CO6         CO1         Understand the importance of business intelligence and its applications in today's world.		9FC17	(Professional Elective –	CO2	2.Analyze different architectures for cloud applications, Create and run Amazon ec2 instance through python programs, assess the performance of cloud services and summarize the innovative applications of IOT on cloud.
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CO6       CO1     Understand the importance of business intelligence and its applications in today's world.				CO4	
CO1 Understand the importance of business intelligence and its applications in today's world.				CO5	
intelligence and its applications in today's world.				CO6	
world.				CO1	-
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				CO2	Illustrate the different form of analytics

	BUSINESS		such as business analytics, predictive analytics.
	INTELLIGENCE (Professional Elective –V)	CO3	Compare in detail the various aspects of business intelligence.
		CO4	Understand the technological components of operational intelligence.
		CO5	Analyze and understand the broad concepts in prescriptive analytics with Decision Tables.
		CO6	Apply business intelligence process for web mining and web analytics.
		CO1	Understand basics of quantum computing
		CO2	Understand physical implementation of Qubit
		CO3	Understand Quantum algorithms and their implementation
9LC21	QUANTUM COMPUTING (Professional Elective – V)	CO4	Understand the Impact of Quantum Computing on Cryptography
		CO5	
		CO6	
		CO1	Explore the methodologies adopted for parallel and distributed environments.
		CO2	Analyze the networking aspects of Distributed and Parallel Computing.
	PARALLEL AND	CO3	Explore the different performance issues and tasks in parallel and distributed computing.
	DISTRIBUTED COMPUTING	CO4	1. Tools usage for parallel and distributed computing.
	(Professional Elective – V)	CO5	Understanding high performance computing techniques
		CO6	
		CO1	Identify different types of agents and their relationships with the environment.
		CO2	Demonstrate the application of agents handling applications dealing with conflict resolution.
	ADVANCED	CO3	Represent knowledge in logical level and also be able to convert it to a form suitable for
9LC02	ADVANCED	CO4	implementation. Derive inferences applying rules of First Order
	INTELLIGENCE AND		Logic.
	DEEP LEARNING	CO5	Formulate an approach for applications involving complete and incomplete Planning.
		CO6	Choose the appropriate learning strategy needed for solving a given problem.
		CO1	Show sensitivity to linguistic phenomena
			and an ability to model them with formal
			grammars.

		CO2	Understand and carryout proper
	NATURAL		experimental methodology for training and evaluating empirical NLP systems.
9LC18	LANGUAGE PROCESSING	CO3	Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.
		CO4	Able to design, implement, and analyze NLP algorithms.
		CO5	Able to design different language modeling Techniques.
		CO6	
		CO1	Comprehend the fundamentals of big data analytics and understand how Hadoop solves the big data problem in real life.
	DIC DATA ANAI VITICS	CO2	Interpret the challenges with big data and elaborate the knowledge about the technological developments in big data environment.
9FC15	BIG DATA ANALYTICS	CO3	Demonstrate the difference between NOSQL and SQL databases.
		CO4	Discuss the Hadoop distributed file system (HDFS) framework and anatomy of Hadoop map- reduce.
		CO5	Design the algorithms to process big data using Apache Spark Low Level API.
		CO6	Apply Hadoop Data Analysis to social Media Analytics and Opinion Mining on Tweets.
		CO1	Discuss system, network and storage virtualization and outline their role in enabling the cloud computing system model.
9LC66	DEEP LEARNING LAB AND BIG DATA ANALYTICS LAB	CO2	Learn The Fundamental Principles Of Deep Learning.
		CO3	Identify The Deep Learning Algorithms For Various Types of Learning Tasks in various domains.
		CO4	Implement Deep Learning Algorithms and Solve Real-world problems.
		CO5	Use Excel as an Analytical tool and visualization tool.
		CO6	Program using HADOOP and Map Reduce.
		CO1	Identify components of Devops environment
		CO2	Apply different project management, integration, testing and code deployment tool
9LC67	PE-IV (SCRIPTING LANGUAGES) LAB	CO3	Investigate different DevOps Software development models

		CO1	Identify components of Devops environment
9LC67	PE-IV (AGILE SOFTWARE DEVELOPMENT)	CO2	Apply different project management, integration, testing and code deployment tool
	LAB	CO3	Investigate different DevOps Software development models
		CO1	Identify components of Devops environment
9LC67	PE-IV (DEVOPS) LAB	CO2	Apply different project management, integration, testing and code deployment tool
		CO3	Investigate different DevOps Software development models
		CO1	At the end of this course, the student will be able to
9LC67	PE-IV (ETHICAL	CO2	Use the available tools to support an ethical hacking procedure.
	HACKING)	CO3	Interpret the results of a controlled attack.
		CO1	Use the concepts learned in the courses, so far, in conceptualizing, designing and executing the modules of the projects.
9L792	SUMMER INDUSTRY INTERNSHIP	CO2	Exhibit the interest in learning the modern tools and technologies through the bridge courses arranged in the college, beyond the curriculum, and hence developing the software.
		CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
		CO4	Improve their communicative skills and team skills

Year and regulation	Course code	Course name		Co's
		FUNDAMENTALS OF	CO1	Understand the role and potential of new and renewable energy sources realize the potential of solar energy, its impact on environment; define and understand the terms describing the different angles that one may incur in setting up a solar panel and be able to use the instruments for measuring solar radiation.
		RENEWABLE ENERGY SOURCES (Open Elective-III)	CO2	Demonstrates the knowledge of different techniques of solar collection and storage.
	9AC45		CO3	Classify different types of horizontal and vertical axis wind mills and understands the performance characteristics of the same. The student also demonstrates the knowledge of different Bio-gas digesters and factors influencing its yield.
			CO4	Understand the potential of geothermal energy in India and will be able to characterize different types of geothermal wells.
			CO5	Differentiate the different methods of kinetic

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			energy extraction from Ocean waves and tides and
			thermal energy extraction from Oceans.
			Demonstrates the knowledge of Direct Energy
		CO6	Conversion in different phenomena viz., Joule
			Thomson effect, Seebeck effect, Peltier effect etc.
			and the principle of operation of Fuel Cells.
		CO1	Understand the basic concepts of product.
		CO2	Determine the process of new product
		002	development and stages in the process.
	PRODUCT AND		Understand the concept of product testing, product
9ZC24	SERVICES	CO3	planning and the preparatory groundwork for
			launching a new product
	(Open Elective-III)		Differentiate various types of services, its
	(°F ··· -··· · ···)	CO4	differences with the goods and the application of
			marketing principles for services.
			Understand the attributes of a good service design
		CO5	and the tools for producing and distributing the
			services.
			Identify the importance of quality of services and
		CO6	also introduce some measurement scales to
			evaluate the service quality.
		CO1	Understand the essentials of entrepreneurship and
			the key role played by the entrepreneurs.
		CO2	Differentiate the different phases of UI /UX.
	ENTREPRENEURSHIP	CO3	Outline the attentiveness on designing a business
9ZC10	AND BUSINESS DESIGN	CO4	strategy.
	(Open Elective –III)	04	Explore on designing and delivery of services. Understand reverse engineering methods in
		CO5	product development.
			Indicate information on IPR, and patent
		CO6	application.
		CO1	Understand the financial structure and the financial
		COI	sector reforms after 1991.
		CO2	Identify the role of RBI and the Regulating and
		02	credit policies adopted by the RBI.
	FINANCIAL		Analyze the role of Non-Banking financial
	INSTITUTIONS,	CO3	institutions and the role of financial institutions in
	MARKETS AND		India.
9ZC15	SERVICES		Understand the role of regulatory bodies like SEBI
		CO4	and also to know the capital and money market
	(Open Elective –III)		instruments.
		CO5	Understand about the asset fund based financial
			services
		CO6	Expose to investment banking and merchant
		000	banking.
		CO1	Familiarize the cryptographic procedures and
			Understand its primitives
			Outline Security policy in Legislation and
00000		CO2	Comprehend E-Commerce frame work, models
9FC07			and its associated threats
	CYBER SECURITY AND	000	Justify the role of electronic signatures in E-
	CYBER LAWS	CO3	Commerce and summarize the various laws
		CO.4	relating to it.
		CO4	Categorize international cyber laws and cyber

				crimes.
			CO5	Explore Penalties, Compensation and Adjunction of violations of provisions of IT Act 2000
			CO6	Classify and Outline the offences under the Cyberspace law and the Internet in India
			CO1	Estimate the human and physical resources required, and make plan for the development of Project.
	9L896	PROJECT	CO2	Break down the Project into tasks and determine handover procedures.
		TROJECT	CO3	Identify links and dependencies, and schedule to achieve deliverables.
		CO4	Allocate roles with clear lines of responsibility and accountability with team spirit.	
			CO5	Design and develop the software or prototype using modern software tools wherever applicable to meet societal needs.
			CO6	Present the Project done and submit the report.

MATRIX ALGEBRA	linear system and also solve real time
AND CALCULUS	problems.
CO2	4
	vectors of a matrix and their application for
	orthogonal transformation.
CO3	5
	of vectors and solve the problems on basis.
CO4	-
CO5	Verify the mean value theorems and also
	express the given function in series form
	using Taylor's theorem.
CO6	Solve the problems using special functions;
	evaluate surface areas and volumes of
	revolutions.
CO1	, , ,
Essential English	audience by listening effectively.
Language Skills (EELS) CO2	
	the apt body language.
CO3	
	skills.
<b>9HC01</b> CO4	
	the standards of corporate and real world in
CO5	a group. Comprehend the reading skills through note
	taking and other study skills.
CO6	· · · ·
	given topic through role play and situational
	dialogues in group discussions.
CO1	
CO2	
Engineering Chemistry	viscosity of lubricant, acid value of an oil.
	Estimate hardness of water.
CO4	
9HC64 CO5	Determine cell constant and conductance of
	solutions, redox potential and emf of
	solutions, the rate constant of acid.
CO6	Synthesize a polymer (Thiokol rubber /
	Urea-Formaldehyde resin), a drug- Aspirin.
C07	· · · · · ·
CO1	<b>U</b> 1
	problems. Translate the given algorithms to
Problem Solving using C	a working and correct program.
9FC61 Lab CO2	
CO3	flat, GI Sheet etc. – hands on experience. Manufacturing of components by machining
	like shafts, holes & threaded holes, surface
	finishing of components etc.



# Course Outcomes of CSE - (Data Science) Department

SREENIDHI INSTITUTE OF

		CO4	Produce small devices / products /appliances by assembling different components.
	Oral Communication	CO1	Describe people, objects and situations
	Skills Lab		using simple sentences.
		CO2	Use appropriate tenses and expressions in
9HC61			different contexts of conversation.
		CO3	Identify major areas of concern in their oral
			communication and address them.
		CO4	Create a SMART plan to enhance their
			communication skills in English

Year and regulation	Course code	Course name		C
			CO1	Differentiate the wave and particle, de- Broglie matter waves-its experimental evidence, Schrodinger's wave concept and its application for a particle in one dimension box.
				Explain about emission, its types, laser principle, types, working and its applications and to reveals about TIR principle, optical fiber-types and signal propagation, attenuation, communication system and applications of optical fibers (sensors and medical endoscopy)
I-II & A22	9HC07 Engineering Physic	Engineering Physics	CO3	Classify magnetism types, Hysteresis, domain theory, Anti-ferro and ferry- magnetism, Superconductivity, experimental facts, theoretical analysis, types of superconductors and its applications.
			CO4	Explain the basic concepts of dielectric materials, polarization and its types, local fields, frequency and temperature effect on dielectrics and their applications (piezo, ferro and Pyro electricity).
			CO5	Elaborate semiconductor behavior, types, carrier concentration, Hall effect, Thermistor, demonstrate and analyze semiconductor devices like a PN- junction, I-V characteristics, LED, solar cell, photo diode and their applications.
			CO6	Summarize nano & bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation





## Department of Computer Science & Engineering (Data Science)

### COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and	Course	Course name		CO's
regulation	code			
			CO1	Understand and analyses microscopic chemistry in terms of atomic orbitals, molecular orbitals and intermolecular forces.
			CO2	Identify and differentiate polymers, thermoplastic, thermosetting plastics and various lubricants.
	9НС04	Engineering Chemistry	CO3	Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.
	911004	Engineering Chemisury	CO4	Understand and interpret the important fundamental concepts of electrochemistry and solve the problems related to batteries.
			CO5	Differentiate the types of corrosion and methods used to prevent the corrosion, surface coating techniques
			CO6	Learn and implement synthesis of drug molecules and learn fundamentals of analytical techniques like electronic, vibrational and rotational spectroscopy.
I-I & A22	9FC01	Problem Solving using C	CO1	Formulate simple algorithms for arithmetic, logical problems and to translate the algorithms to programs (in C language)
			CO2	Test and execute the programs and correct syntax and logical errors, to implement conditional branching, iteration and recursion
			CO3	To decompose a problem into functions and synthesize a complete program using divide and conquer approach.
			CO4	To use arrays, pointers and structures to formulate algorithms and programs.
			CO5	To apply programming to solve matrix addition and multiplication problems and searching and sorting problems.
			CO6	To apply programming to solve simple numerical method problems, namely rot finding of function, differentiation of function and simple integration.
	9HC11		CO1	Check the consistency or inconsistency of a

			methods (physical & chemical), analysis
			the techniques like XRD, SEM, TEM
			and also to understand the radioactivity,
			fusion & fission, alpha, beta and gamma
			rays decay and its applications.
	Data Structures using C	CO1	Demonstrate the concepts of Abstract
			data type and also applications of stack
			and Queues.
		CO2	Select the data structure that efficiently
			model the information in a problem.
		CO3	Design programs using variety of data
			structures including Trees, AVL Trees
			and Graphs and their applications.
		CO4	Solve problems and also assess
9EC01			efficiency trade off among searching and
			sorting using time complexity of each
			algorithm and also the applications of
			hashing and hash tables.
		CO5	Describe the concepts of OOPs and
		000	implement programs using objects,
			classes, constructors and destructors.
		CO6	Apply concepts of OOPs to write
		000	program on over loading functions and
			concepts of inheritance.
	Basic Electronics and	CO1	Understand and apply the principles of
	Electrical Engineering	001	electrical engineering to solve basic
			equations.
		CO2	Apply the knowledge gained to explain
		002	the principles of single and three phase
			AC circuits.
		CO3	
 9HC12		COS	"Apply the knowledge gained to explain the principle and expertise of DC
			the principle and operation of DC
		CO4	machine along with its applications".
		CU4	Use the principles of single-phase
			transformer along with its applications
		COF	and solve the equations.
		CO5	Realize the principle and operation of
			three phase induction motor with its
		001	applications.
	Engineering Graphics	CO1	Get familiar to use the instruments to
			solve the engineering problem and draw
			various type of curves used in
9BC01			engineering.
		CO2	Understand and Implement Orthographic
			projections and draw projections of
			simple drawing entities such as points
			Lines, and Planes.

			CO3 CO4 CO5 CO6	<ul> <li>Draw projections of different types of regular solids in various positions write principal planes of projection.</li> <li>Draw Sections of various Solids including Cylinders, cones, prisms and pyramids and draw the developments of these solids and their sections.</li> <li>Construct Isometric Scale, Isometric Projections and Views and convert 3D views to 2D orthographic views.</li> <li>Understand from basic sketching</li> </ul>
				through 2D and 3-D solid modeling using computer aided design (CAD) software.
			CO1	Understand, Analyze and respond to the audience by listening effectively
	9HC02	Oral Communications Lab	CO2	Practice effectively the speaking skills with the apt body language
			CO3	Develop strategies to improve speaking skills
			CO4	Plan, prepare and present effectively to meet the standards of corporate and real world in a group
			CO5	Comprehend the reading skills through note taking and other study skills
			CO6	Express the opinions effectively on the given topic through role play and situational dialogues in group discussions
			CO1	Understand the concepts of photo electric effect, importance, photo current, color filters, optical sensors.
	9HC66 Engineering Physics Lab	0 0 0	CO2	Write programs using tree traversals. In order, preorder and post order.
		CO3 CO4	Program searching, sorting and hashing operations.	
			C04 C05	Write programs on Binary treesImplement classes and operatoroverloading.

Year and regulation	Course code	Course name	Co's		
	8HC16	Probability & Statistics	CO1	Solve the random variable problems and probability distributions.	
			CO2	Estimate the parameters and solve the problems	

				using control limit theorem
			<u> </u>	using central limit theorem.
			CO3	Test the hypothesis related to samples
				concerning to the means and proportions of large
			~ ~ /	size samples.
			CO4	Apply and solve the problems using t-test, Chi-
				square test also testing the hypothesis problems
				on small size samples, goodness of fit and
				independence of attributes.
			CO5	Solve the problems on measures of central
				tendency, Correlation
			CO6	Classify and differentiate various regression
				models
			CO1	Understand the fundamentals of electrical
				engineering and DC machines.
			CO2	0 0
		Elements of Electrical	CO3	Understand the principle and operation of three
	8AC48	and Electronics		phase induction motor and measuring
	011010	Engineering		instruments.
		88	CO4	Understand the principle and operation of diode.
II-I & A20			CO5	Understand the principle and operation of diode.
			005	transistor.
			CO6	
			C00	Understand and comprehend the fundamentals
			COI	
				of JAVA, its Classes, and Objects and write
			<u> </u>	simple programs using constructors.
		Object Objected	CO2	Write programs using inheritance, interface and
	95000	Object Oriented	<u> </u>	packages.
	8EC02	Programming through Java	CO3	Write programs using inheritance, interface and packages.
		Java	CO4	
			04	1 I E
			005	Multithreading.
			CO5	
				develop applications using event handling.
			CO1	Evaluate alamentary methametical array arts
			CO1	Evaluate elementary mathematical arguments
				and identify fallacious reasoning (not just
				fallacious conclusions).
			CO2	Reason about arguments represented in
	05202			Predicate logic.
	8F303	Discrete Mathematics	CO3	Perform operations on discrete structures such as
				sets, functions, relations, and sequences.
			CO4	Solve discrete mathematics problems that
				involve: computing permutations and
				combinations of a set.
			CO5	Analyze and deduce problems involving
				recurrence relations and generating functions.

	1	1	1	
			CO6	Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction, for example, scheduling.
			CO1	Perceive basic operational concept of computer
			CO2	and data processing. Use data types with instruction set of specified
	8DC10	Computer Organization and Architecture	CO3	architecture Justify different control unit design and
			<u> </u>	algorithms for various operations.
				Elaborate basic architecture of 8086 processor
			CO5	Write assembly language programming and debug to 8086
			CO6	1
			CO1	Apply process models in real world software products.
			CO2	Classify software requirement specification
	8D310	Software Engineering		document.
			CO3	Design system models and user interface.
			CO4	Evaluate test strategies for various softwares.
			CO5	Describe product metrics, risks.
			CO6	Understand the quality management.
			CO1	This course also discusses their role in their family. It, very briefly, touches issues related to
				their role in the society and the nature, which
				needs to be discussed at length in one more
				semester for which the foundation course named
	011017	Universal Human		as "H-102 Universal Human Values
	8HC17	values	CO2	Understanding Harmony is designed which may
				be covered in their III or IV semester. During the
				Induction Program, students would get an initial
				exposure to human values through Universal
				Human Values – I. This exposure is to be
				augmented by this compulsory full semester foundation course.
			CO1	Write programs to generate Prime numbers,
				Roots of quadratic equation and Fibonacci
				series.
			CO2	Write small application such as banking system.
		Object oriented	CO3	Write programs on operator, function
	8EC62	programming through Java Lab		overloading and dynamic method dispatch.
		Java Lau	CO4	Write programs to implement interface and
			CO5	packages. Explain and write programs to implement
			05	threads.
			CO6	Write programs to implement applets and event
	1		200	regrams to implement applets and event

				handling.
			CO7	Write an application to implement client and
			07	server scenario.
			CO1	Students can able to identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product.
	8EC77	Software Engineering and Computer	CO2	Students understand the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving.
		Organization Lab	CO3	Students can define and design models for the requirements stated in the software project.
			CO4	Students can able to design class, object and interactive diagrams and know their significance.
			CO5	Students can able to design advanced behavioral and architectural modeling and work on case studies.
	8AC77	Elements of Electrical and Electronics Engineering Lab	CO1	Understand the working of single-phase transformer under different conditions, the performance of three phase induction motor, different speed control methods of DC motor with and without loading with its performance.
			CO2	Understand the applications of Thevenin's Theorem in circuit analysis.
			CO3	Identify, Specify and test R, L, C Components (Colour Codes), Potentiometers, Switches, Coils, Relays.
			CO4	Identify, Specify and test Active Devices, Diodes, BJTs, Low power JFETs.
			CO5	Explain and demonstrate working of PN Junction and Zener diode.
			CO6	Explain and demonstrate working Half and Full wave Rectifier without filters.
			CO7	Demonstrate working of CE characteristics and its application as an amplifier.
	8M378	Comprehensive Test	CO1	Comprehend the concepts in the Core Courses 1styearand 2nd year 1st Semester.
		and Viva-voce – III	CO2 CO3	Assess technical knowledge to face interviews. Exhibit lifelong learning skills to pursue higher
	8M386	Technical Seminar – III	CO1	studies or professional practice. Identify current general, political and technology related topics.
			CO2	Arrange and present seminar in a effective

	manner
CO3	Collect, survey and organize content in
	presentable manner
CO4	Demonstrate oratory skills with the aid of Power
	Point Presentations.
CO5	Exhibit interview facing skills and team leading
	qualities

Year and regulation	Course code	Course name		Co's
			CO1	Learn about various data types, types of data sets a data quality
			CO2	Implementation of R fundamentals and perform factors and data frames.
	8EC40	Introduction to Data Science	CO3	Implementation of data structures iterative programming & function concepts using R
			CO4	Learn about data visualization techniques and apply suitable visualization techniques
			CO5	Learn about dimensionality reduction based on examples illustrations
			CO6	"
			CO1	Analyze worst-case running times of algorithms using asymptotic analysis.
	8FC05	Design and Analysis of Algorithms	CO2	Synthesize divide and-conquer algorithms. Derive and solve recurrences describing the
				performance of divide-and-conquer algorithms.
			CO3	Describe the greedy paradigm and explain when an algorithmic design situation calls
				for it. Recite algorithms that employ this paradigm. Synthesize greedy algorithms, and analyze them.
II-II & A20			CO4	Comprehend the concept of dynamic programming algorithms, their applications and analyze them.
			CO5	Analyze the Backtracking and Branch and Bound algorithms and also identify the scenarios for its applicability.
			CO6	Comprehend the concept of P and NP Problems and its usage in the applications.
	8EC03	Database Management Systems	CO1	Comprehend importance, significance, models, Database languages, architecture
		Management Systems	CO2	and design of DataBaseSystems.Design Relational Models and applyIntegrity Constraints, Querying

[		r	-	
				fundamentals, Logical data base Design and
				Views of databases along with application of
				Relational Algebra.
			CO3	Apply queries in SQL Query using Nested
				Queries Set, Comparison Operators,
				Aggregative Operators, Logical
				connectivity's with Joins statements and
				develop applications.
			CO4	Eliminate data redundancy through
				normalforms.
			CO5	Ensure ACID properties and Serializability
			005	in Transaction management and Database
				Recovery.
			CO6	Use different External Storage Organization
			000	techniques and apply Indexing in databases
				to enhance systemperformance.
			CO1	Understand the functional architecture of an
			COI	
				Operating System with usage of system
			<u> </u>	calls.
			CO2	Analyze various process scheduling
		Operating Systems		algorithms & pragmatics of scheduling
				algorithms used by various Operating
				Systems.
	8EC06		CO3	Solve issues related to process
	02000	operating bystems		synchronization and Deadlocks in the
				Operating System.
			CO4	Illustrate the concepts of Memory
				Management.
		-	CO5	Outline the directory structure & analyze
				disk scheduling algorithms.
			CO6	Summarize the aspects of Protection and
				Security, and understand the concepts of I/O
				systems.
			CO1	Apply the rules of Boolean algebra to
				simplify Boolean expressions.
			CO2	Simplify of Boolean expressions using K-
				map.
			CO3	Design MSI combinational circuits such as
				full adders, multiplexers, decoders, encoders.
	8CC55	<b>Digital Electronics</b>		Code converters.
			CO4	Design basic memory units (latches and flip-
			0.04	flops) and sequential circuits such as
				counters and registers
			CO5	Create digital design using PLD's such as
			COS	
			000	ROM's, PLA's, PAL s.
1	1		CO6	Design the digital controllers using

				Also 'day's Gree Martin Chart
			001	Algorithmic State Machine Charts.
		-	CO1	Assess themselves using SWOT analysis.
			CO2	Appraise the importance of certain soft skills
		-	~~~	like time management and goal setting.
			CO3	Improve their verbal ability to handle the
	911002	C - & C1-:11-		competitive exams.
	8HC03	Soft Skills	CO4	Enhance their team skills and design tinking capabilities for effective problem solving and
				decision making.
			CO5	Know their emotional quotient which guidestheir
			000	thinking, behavior and helps them manage stress
		-		efficiently.
			CO6	Equip themselves with the prerequisites, and
				relevant techniques to effectively attend
				corporate interviews.
			001	Acquire the basics of Managerial Economics at Micro
			CO1	level, Demand analysis and production analysis in particular
		-		Gain exposure on Cost concept, Revenues and Market
			CO2	structure and describe the concepts.
			CO3	Comprehend the basic concepts of Accounting, Double
		Economics, Accountancy and Management Science	005	entry system and Book keeping.
	8ZC01		CO4	. Interpret the concepts of Capital expenditure, Revenue
				expenditure and Final accounts ad their significance. Gain knowledge and elaborate the basics of
			CO5	Management, its principles and various functions
			005	performed in organization
			CO6	Recognize various personality traits, perception,
			000	attitudes of individuals working in organization
			CO1	application."
	8EC63		CO2	"Write Queries using Aggregate functions such as
				[COUNT, SUM, AVG, MAX, MIN, GROUP BY, HAVING], Conversion functions and use
				string functions for a given
		Database Management	CO3	"Explain and write programs using PL/SQL
				programs using exceptions, COMMIT,
	01005	SystemsLab		ROLLBACK and SAVEPOINT in PL/SQL block."
			CO4	"Develop programs using WHILE LOOPS,
				FOR LOOPS, nested loops using BUILT-
			CO5	"Write Programs for stored functions invoke
				functions in SQL Statement and write
			CO6	Describe and write programs using features
				of CURSORs and its variables.Develop
			C07	Programs implementing Triggers.
			CO1	Implement Merge sort algorithm for sorting a list of integers in ascending order, Dijkstra's algorithm for
				the single source shortest path problem.
		Design and Analysis of	CO2	Implement Prim's algorithm to generate minimum cost
	8MC61	Algorithms and R	202	spanning tree.
		programming Lab	CO3	Solve the job sequencing with deadlines problem using
			200	greedy algorithm.
			CO4	Design the solution for the 0/1 knapsack problem using
			201	implement DynamicProgramming and implement.
L	1			imprement Dynamier regramming and imprement.

		CO5	Using Dynamic programming approach solve the Optimal Binary search Tree problem.
		CO6	Design and implement n-queens problem using backtracking approach.
8EC66	Operating Systems Lab	CO1	Simulate and implement operating system concepts such as scheduling, deadlock management, page replacement techniques, file management and memory management
	Comprehensive Test	CO1	Comprehend the concepts in the Core Courses 1st year and 2nd year.
8M479	Comprehensive Test and Viva –Voce – IV	CO2	Assess technical knowledge to face interviews.
		CO3	Exhibit lifelong learning skills to pursue higher studies or professional practice.
		CO1	Deliver lecture on emerging technologies.
		CO2	Explain domain knowledge to resolve real time technical issues
8M487	Technical Seminar – IV	CO3	Demonstrate ability to lead and explain concepts and innovative ideas.
	ĨV	CO4	Demonstrate team leading qualities.
		CO5	Demonstrate public speaking and lifelong learning skills for higher studies and to pursue professional practice.
		CO6	Exchange new information that would not have been available otherwise.
		CO7	Develop debating and interview skills.

Year and regulation	Course code	Course name	Co's	
		Banking Operations, Insurance and Risk Management <b>Open Elective-I</b>	CO1	Describe the new dimensions and products served by the banking system in INDIA.
			CO2	Explain the credit control system and create awareness on NPA's.
	8ZC05		CO3	Apply the knowledge of Insurance concepts in real life scenarios.
			CO4	Recognize the importance of regulatory and legal frame work of IRDA.
			CO5	Identify the risk management process and methods.

			CO6	Calculate the diversity of risk and return.
	8FC13		CO1	Explain primitives of Project Planning and evolution of software economics.
			CO2	Describe software economics; reduce Software product size, improvement in software processes, improving team effectiveness, improving automation, Achieving quality.
			CO3	Explain Life cycle phases and Artifacts of the process.
		Software Project	CO4	Describe Model based software architectures and Work Flows.
III-I & A20		Management	CO5	Apply Checkpoints for a process such as Major mile stones, Minor Milestones and apply work breakdown structures for a iterative process within cost and schedule. Describe Project Organizations and Responsibilities.
			CO6	Describe Automation and Project Control and Process instrumentation and explain Future Software Project Management such as Modern Project Profiles and Next generation project management.
	8EC07		CO1	Demonstrate the use of HTML tags. Apply Styles using CSS and Bootstrap. Develop dynamic programs using Javascript and Typescript.
			CO2	Develop scripts using XML and validate using parsers. Design a data-interchange format using JSON.
		Web Technologies	CO3	Appraise the Expressions, Filters, Directives, Controller, and Modules of Angular.
			CO4	Design responsive web applications with Forms, Scope, Dependency Injection & Services, and Single Page Application (SPA) of Angular.
			CO5	Comprehend the uses of Web servers and design the server-side scripts using Servlets.
			CO6	. Design and develop server-side scripts and components using PHP.
	8MC01		CO1	Understand the fundamentals of Data Mining.
		Data Mining	CO2	Understand the techniques used in data preprocessing.
			CO3	Learn insights of Data Mining Primitives and Infer the significance of Concept Description.

		CO4	Apply the algorithms for mining association rules in large databases.
		CO5	Discuss and apply the models of classification and use those models for the prediction of the new samples.
		CO6	Applyvariousclusteringtechniquesavailablefornumerousapplications.Identify the optimal clustering technique for a particular application.for
8MC0	2	CO1	Understand architecture of data warehouse and OLAP operations.
	Data Warehousing	CO2	Understand Fundamental concepts of BI and Analytics.
	and Business Intelligence (DW and	CO3	Understand basic reporting and querying and Design of Dashboards.
	BI)	CO4	Learn BI Strategy, Architecture.
		CO5	Design / Build a BI project plan with best practices.
		CO6	Understand BI target.
8EC0:	5	CO1	Understand concepts of different networks, network models and transmission medias.
		CO2	Classify various data conversion techniques and Multiplexing, Demultiplexing techniques.
		CO3	Summarize the design issues of Datalink layer and solve problems on Error and Flow control.
	Data Communication and Networks	CO4	Infer MAC layer protocols, various connecting devices, IP addressing concepts and design a network(using subnetting and supernetting techniques)
		CO5	Analyze various routing algorithms and outline the concepts of Internet control protocols and congestion control techniques.
		CO6	Recognize services and protocols of transport layer, application layer along with network security issues.
8HC0:	5	CO1	Understand about ecosystem and energy flow among the organisms.
	Environmental	CO2	Know the resources available, use of them and overexploitation of the resources in the nature.
	Science and Ecology	CO3	Learn the value, use and value of biodiversity.
		CO4	Understand the causes and effect of pollutionIand implement measures in control ofb

		1 1		· · · ·
				pollution.
			CO5	Understand the sustainable development and
				implement green technology for sustainable
				development.
			CO6	Learn and implement policy to protect the
				environment.
			CO1	Work with the ETL and Mining tools.
	8MC62		CO2	Demonstrate the classification, clustering
				techniques on the data sets.
		Data Mining and	CO3	Comprehend the results obtained in the
		DWand BI Lab		clustering, Association and Classification
		D w and DI Lau		techniques applied on the data sets with
				varied input parameters.
			CO4	Ability to apply mining techniques for
				realistic data.
			CO1	Implement and analyze framing methods of
				the data link layer.
		Computer Networks Lab	CO2	Implement and analyze framing methods of
				the data link layer.
	8EC65		CO3	Illustrate and implement error detection &
				correction techniques.
			CO4	Implement different Routing Algorithms.
			CO5	Understand basic Network Commands.
			CO6	Use of Wireshark and NS-2 tools.
			CO1	Demonstrate the use of HTML tags and be
				able to design web pages.Develop dynamic
				programs involving Java scripts, popup
				windows in JavaScript along Event
				Handling.
			CO2	Develop scripts using XML and XSLT and
	8EC67			read XML documents using parsers, DOM
		Web Technologies		parser, and SAX parser. Develop JSON files
		Lab		and access them via HTML pages.
		Lau	CO3	Implement Angular with Expressions,
				Filters, Directives, Controller, and Modules.
			CO4	Develop a Single Page Application with
				implementation of Scope and Form.
			CO5	Implement Java servlets using Apache
				Tomcat Server for User authentications.
			CO6	Develop an application in PHP with
				Database connectivity.
			CO1	Use the concepts learned in the courses, so
		Summer Industry		far, in conceptualizing, designing and
	8M591	-		executing the modules of the projects.
		Internship -I	CO2	Exhibit the interest in learning the modern
				tools and technologies through the bridge

	courses arranged in the college, beyond the curriculum, and hence developing the software.
CO3	Inculcate an enthusiasm to use the creative ideas to build the innovative projects and prototypes which are meeting the current needs of the market and society as a whole.
CO4	Improve their communicative skills and team skills.

Year and	Course	Course name		Co's
regulation	code			
			CO1	Students will understand the nature of Entrepreneurship and its importance.
		ENTREPRENEURSHIP	CO2	Will gain knowledge regarding project, its
		PROJECT	CO2	life cycle and organization.
	8ZC19	MANAGEMENTAND STRUCTURED	CO3	Will gain knowledge relating to project formulation and implementation.
		FINANCE	CO4	Comprehend the components of structured
		(Open Elective –II)		finance.
			CO5	Establish a framework of CMBS.
			CO6	Students will gain knowledge relating to
			<b>G</b> Q 1	the CRE Servicing.
			CO1	Identify vast application areas for mobile /wireless communications and Understand
		-		GSM Architecture, Services.
			CO2	Examine Hidden and exposed terminals,
			002	Near and far terminals and Differentiate
				medium access control methods for
				wireless communication SDMA, FDMA,
				TDMA and CDMA.
		MOBILE	CO3	Illustrate mobile IP primitives in Network
	00015	COMPUTING		layer and Demonstrate IP packet delivery,
III-II &	8EC15	(Professional Elective -	004	DHCP.
A20		II)	CO4	Distinguish Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP in Transport
				layer.
			CO5	Understand applications of MANETs
				routing algorithms, data hoarding, client
				server computing along with the data
				delivery mechanisms.
			CO6	Understand protocols and tools such as
				WAP, Bluetooth and Identify emerging
			001	mobile operating systems.
	8FC07	Automata Theory and	CO1	Design the finite automata different
		Compiler Design		Languages

8MC03       Data Visualization Techniques       CO1       Cost funct finite Automata for a given regrammars and normal forms. CO3       Design the push down automata and Turing Machine for complex languages. CO4         Understand LEX tool and relate parsing techniques.       CO5       Demonstrate and solve problems on SL4. CC4. CLR, LALR, operator precedence parser, LR (0), LR(1), LR(K) grammar and use YACC tool.         SMC03       Data Visualization Techniques       CO1       Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form.         SMC03       Data Visualization Techniques       CO1       Visualization to hypic the visualization techniques in physical sciences, computer science, applied mathematics and medical science.         SMC03       Data Visualization Techniques       CO1       Learn the distinction between optimat reasoning vs. human like reasoning and formulate an efficient problem space for a problem and estimate its time and space complexities.         SLC01       Introduction Artificial Intelligence       CO2       Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.         SLC01       Introduction Artificial Intelligence       CO3       Learn different knowledge representation techniques.         SUC01       Introduction Artificial Intelligence       CO3       Learn the distinction between optimad reasoning vs. human like reasoning an	<b></b>	1		<b>a</b> ~ •	
8MC03       Data Visualization Techniques       CO1       Design the push down automata and Turing Machine for complex languages.         8MC03       Data Visualization Techniques       CO5       Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (O), LR(1), LR(K) grammar and use YACC tool.         8MC03       Data Visualization Techniques       CO6       Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form.         8MC03       Data Visualization Techniques       CO1       Visualize the objects in different dimensions.         CO2       Design and process the data for Virtualization.       CO3       Apply the visualization techniques in physical sciences, computer science, applied mathematics and medical science.         SUC01       Introduction Artificial Intelligence       CO1       Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.         CO3       CO4       Apply Al techniques to solve problems of game playing, theorem proving, and machine learning.         CO3       CO3       CO3       Learn different knowledge representation techniques.         CO4       Apply Al techniques to solve problems of game playing, theorem proving, and machine learning.         CO3       Learn different knowledge representation techniques.				CO2	regular expressions, and derive strings with suitable examples. Conceptualize
8MC03       Data Visualization         CO2       CO3         Apply the visualization Techniques       CO3         CO4       Understand LEX tool and relate parsing techniques, code generation such as 3-address code form.         CO6       Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form.         CO1       Visualize the objects in different dimensions.         CO2       Design and process the data for Virtualization techniques in physical sciences, computer science, applied mathematics and medical science.         CO4       Apply the visualization techniques for research projects. (KI, K3).         R       CO1         Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem applying, theorem proving, and machine learning.         RLO1       Introduction Artificial Intelligence         8LC01       Introduction Artificial Intelligence         CO2       Apply the chrone proving, and machine learning.         CO3       Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient roblem space for a problem actine terming.         CO3       Learn the distinction between optimal for a problem expressed in natural language.         Also select a search algorithm for a problem sof game playing, theorem proving, and machine le				CO3	Design the push down automata and
8MC03       Data Visualization         CO2       CO3         CO3       Data Visualization         CO4       CO3         CO5       CO3         Apply the visualization techniques         CO4       CO4         CO5       CO3         Apply the visualization techniques         CO4       CO4         CO5       CO3         Apply the visualization techniques         CO4       CO4         CO5       CO4         Apply the visualization techniques in physical sciences, computer science, applied mathematics and medical science.         CO4       Apply the visualization techniques for research projects. (K1, K3).         CO5       CO4         Apply APPL       Visualization techniques for a problem expressed in natural language. Also select a search algorithm for a problem sof game playing, theorem proving, and machine learning.         CO3       Learn different knowledge representation techniques.         CO4       Visualization techniques of state space complexities.         CO5       Complexities.         CO4       CO4         Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.         CO3       Learn different knowledge representation techniques.         CO4 <td< td=""><td></td><td></td><td></td><td>CO4</td><td>Understand LEX tool and relate parsing</td></td<>				CO4	Understand LEX tool and relate parsing
8MC03       Data Visualization       CO1       Visualize the objects in different dimensions.         CO2       Design and process the data for Virtualization.       CO3       Apply the visualization techniques in physical sciences, computer science, applied mathematics and medical science.         CO4       Apply the visualization techniques for research projects. (K1, K3).         CO5       CO1       Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem and estimate its time and space complexities.         8LC01       Introduction Artificial Intelligence       CO2       Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.         CO4       Understand the concepts of state space complexities.       CO4       Understand the concepts of state space complexities.         CO4       CO4       CO4       Understand the concepts of state space complexities.       CO4         CO5       Comprehend the applications of Probabilistic Reasoning and Sproblem space space complexities.       CO4				CO5	CLR, LALR, operator precedence parser, LR (O), LR(1), LR(K) grammar and use
8MC03       Data Visualization Techniques       CO2       Design and process the data for Virtualization         CO3       Apply the visualization techniques in physical sciences, computer science, applied mathematics and medical science.         CO4       Apply the virtualization techniques for research projects. (K1, K3).         CO1       Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem and estimate its time and space complexities.         8LC01       Introduction Artificial Intelligence       CO2       Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.         CO3       Learn different knowledge representation techniques.       CO3       Learn different knowledge representation techniques.         CO4       Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.         CO5       Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning				CO6	design compiler: and describe Intermediate code generation such as 3-address code
8MC03       Data Visualization Techniques       CO3       Apply the visualization techniques in physical sciences, computer science, applied         8MC03       Data Visualization Techniques       CO3       Apply the visualization techniques in physical sciences.         CO4       Apply the virtualization techniques for research projects. (K1, K3).         CO1       Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem and estimate its time and space complexities.         8LC01       Introduction Artificial Intelligence       CO2       Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.         CO3       Learn different knowledge representation techniques.       CO3       Learn different knowledge representation techniques.         CO4       Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.         CO5       Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.				CO1	5
SMC03       Techniques       physical sciences, computer science, applied mathematics and medical science.         CO4       Apply the virtualization techniques for research projects. (K1, K3).         CO1       Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem and estimate its time and space complexities.         8LC01       Introduction Artificial Intelligence       CO2       Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.         CO3       Learn different knowledge representation techniques.       CO4       Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.         CO4       Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.         CO5       Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.		8MC03		CO2	Virtualization.
8LC01       Introduction Artificial Intelligence       CO2       Apply the virtualization techniques for research projects. (K1, K3).         8LC01       Learn the distinction between optimal reasoning vs. human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space complexities.         CO2       Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.         CO3       Learn different knowledge representation techniques.         CO4       Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.         CO5       Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.				CO3	physical sciences, computer science, applied
8LC01Introduction Artificial IntelligenceCO2Apply AI techniques to solve problems of game playing, theorem proving, and machine learning.8LC01Introduction Artificial IntelligenceCO3Learn different knowledge representation techniques.CO4Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.CO5Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.				CO4	Apply the virtualization techniques for
8LC01       Introduction Artificial Intelligence       Introduction Artificial Intelligence       CO3       Learn different knowledge representation techniques.         CO4       Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.         CO5       Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.				CO1	reasoning vs. human like reasoning and formulate an efficient problem space for a problem expressed in natural language. Also select a search algorithm for a problem and estimate its time and space
Intelligence       CO3       Learn different knowledge representation techniques.         CO4       Understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.         CO5       Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.		8LC01		CO2	game playing, theorem proving, and
representation, exhaustive search, heuristic search together with the time and space complexities.         CO5       Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.				CO3	
CO5 Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning vs. Learning Decision Trees.				CO4	representation, exhaustive search, heuristic search together with the time and space
				CO5	Comprehend the applications of Probabilistic Reasoning and Bayesian Networks, analyze Supervised Learning
		8EC17	Machine Learning	CO1	

			~ ~ ~	ML and Designing a Learning System.
			CO2	Understand the basic concepts of linear
		-		models, tree and Probabilistic Models.
			CO3	3. Understand the Probability models
				namely supervised, unsupervised, basic
				statistics analyze their analysis of
		-		algorithms along with their applications.
			CO4	4. Understand various Dimensionality
				Reduction Techniques and Apply various
				Evolutionary Algorithms with models
			CO5	5. Understand the Graphical models and
				their applications
			CO6	6. Understanding Analytical Learning and
				Analyze KBANN Algorithm
			CO1	Demonstrate a breadth of knowledge in
		-		Intellectual property .
			CO2	Overview of Patents, Searching, filling and
				drafting of Patents.
		Intellectual Property	CO3	Overview of copyright & GI.
	8GC49	Rights	CO4	Overview of Trade Mark & Trade Secret,
			CO5	Overview of Integrated Circuit and
				Industrial Design.
			CO6	Knowledge about different national and
				international: Conventions and Treaties
				Governing the IPRs
		Machine Learning Lab	CO1	Understand complexity of Machine Learning
			000	algorithms and their limitations;
			CO2	Understand modern notions in data analysis-
			~ ~ ~	oriented computing;
	8MC64		CO3	Be capable of confidently applying common
				Machine Learning algorithms in practice and
				implementing their own;
			CO4	Be capable of performing experiments in
				Machine Learning using real-world data.
	8MC65	Artificial Intelligence and Compiler Design Lab	CO1	Apply basic principles of AI in solutions
				that require problem solving, knowledge
				representation, and learning.
			CO2	Implementation of DFA for a given
				Language / Regular Expression
			CO3	Usage LEX of tool to implement lexical
				analyzer in compiler design and
				implementation of Top-Down Parser.
			CO4	Usage of YACC tools for implementing
				bottom up parser.

		CO1	Use the concepts learned in the courses, so
			far, in conceptualizing, designing and
			executing the modules of the projects.
		CO2	Exhibit the interest in learning the modern
			tools and technologies through the bridge
			courses arranged in the college, beyond the
			curriculum, and hence developing the
8M680	Group Project		software.
011000	Gloup Hojeet	CO3	Inculcate an enthusiasm to use the creative
		005	ideas to build the innovative projects
			which are meeting the current needs of the
			e
			market and society as a whole.
		CO4	Improve their communicative skills and
			team skills largely improve.
		CO5	Work as an individual and in a team.
		CO1	Comprehend the concepts in the Core
			Courses 1st year.
014602	Comprehensive Viva	CO2	Assess technical knowledge to face
81/1692	Voce		interviews.
		CO3	Exhibit life long learning skills to pursue
			higher studies or professional practice.
	8M680 8M692	8M692 Comprehensive Viva	8M680       Group Project       CO3         CO3       CO4         CO4       CO5         CO1       CO1         8M692       Comprehensive Viva Voce



## Course Outcomes of CSE - (Internet of Things) Department

SREENIDHI INSTITUTE OF SCIENCE AND





### Department of Computer Science & Engineering (Internet of Things) COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Year and	Course	Course name	Co's	
regulation	code			
	9HC07	Engineering Physics	CO1	Explain semiconductor behaviour, types and their applications
			CO2	Differentiate the wave and particle, and its application for a particle in one dimension box
			CO3	Explain about emission, its types, laser principle and applications of optical fibers (sensors and medical endoscopy)
			CO4	Reveals about the magnetism-its origin and types and its applications
			CO5	Explain the basic concepts of dielectric materials, polarization and its types, their applications (piezo, ferro and Pyro electricity).
			CO6	Summarize nano& bulk concepts, surface to volume ratio and its applications.
	9FC01	Problem Solving using C	CO1	Explain basic fundamentals of Computer Systems , computing environments , Computer Languages – Machine Languages
I-I & A22			CO2	Describe C language Programs, Structure of a C Program
			CO3	Describe write programs using control structures such as Pre-test and post-test loops, while, do while, for, break
			CO4	Write programs implementing application on arrays
			CO5	Write programs using Pointers and string handling functions
			CO6	Write programs using Enumerated, Structure, Union types and files.
	9HC11	MATRIX ALGEBRA AND CALCULUS	CO1	1. Check the consistency or inconsistency of a linear system and can solve the problems.
			CO2	2. Find the Eigen values and Eigen vectors and can solve the problems associated with these concepts.
			CO3	3. Find the nature, index and signature of the quadratic form.
			CO4	<ul> <li>Verify the applicability of mean value theorems and also can express the givenstandardfunction in series form using Taylor's and Maclaurin series.</li> </ul>
			CO5	5. Find the solutions of first order

				first de sur differentiel e sustieur
				first degree differential equations and solve the problems on
				Newton's law of cooling, Natural
				growth and decay.
				6. Solve higher order ordinary
			000	differential equations with
			CO6	constant coefficients using some
				standard methods.
				Demonstrate competence with suitable
		Essential English Language Skills (EELS)	CO1	accuracy in vocabulary, and language
				fluency.
			CO2	• State the definition of nouns, verbs,
				adjectives, and adverbs. · Identify the differences of each tense
			CO3	and use the tenses accurately.
	9HC01			Identify specialized reading strategies for
			CO4	specific types of texts
			CO5	• Produce written work that is substantive,
			005	organized, and grammatically accurate.
				Demonstrate competence with suitable
			CO6	accuracy in vocabulary, and language
				fluency. Get familiar to use the instruments to solve
			CO1	the engineering problem and draw various
		Engineering Graphics	001	type of curves used in engineering
		Engineering Graphics		Understand and Implement Orthographic
			CO2	projections and draw projections of simple
	9BC01		02	drawing entities such as points Lines, and
				Planes
			~~~	Draw projections of different types of
			CO3	regular solids in various positions wrt
				principal planes of projection Draw Sections of various Solids including
				Cylinders, cones, prisms and pyramids and
			CO4	draw the developments of these solids and
				their sections.
				Construct Isometric Scale, Isometric
			CO5	Projections and Views and convert 3D views
				to 2D orthographic views
			<b>G</b> Q (	Understand from basic sketching through 2D
			CO6	and 3-D solid modeling using computer aided design (CAD) software
				Describe people, objects and situations using
	9HC61	Oral Communication Lab-I	CO1	simple sentences.
			000	Use appropriate tenses and expressions
			CO2	in different contexts of conversations.
			CO3	· Identify major areas of concern in their
				oral communication and address them.
			CO4	• Create a SMART plan to enhance their
				communication skills in English
			CO5	Describe people, objects and situations using simple sentences.
				Use appropriate tenses and expressions
			CO6	in different contexts of conversations.
			1	Demonstrate the wave length of
	9HC66		CO1	monochromatic source of light by using
				Newton's Rings
				-

		Engineering Physics Lab		Analyze refractive index of a material prism
		Engineering Physics Lab	CO2	and Dispersive power of a glass Prism by
			02	
				using spectrometer
			<b>CO</b> 2	Determine the wave length of spectral light
			CO3	and laser Source of light by using Diffraction
			~~ .	Grating
			CO4	Design and Analyze RC Circuits
			CO5	Analyze RLC Series circuit and parallel
			005	circuit
			CO6	Investigate magnetic Circuits
				Explain basic fundamentals of Computer
				Systems, computing environments,
		Problem Solving using C Lab	CO1	Computer Languages – Machine Languages.
		Troblem Solving using C Lub		Writing/ Drawing simple Algorithms and
				flowcharts.
			000	Formulate the algorithms for
			CO2	simple problems
			GOA	Translate the given algorithms to
			CO3	a working and correct program
				Correct the syntax errors as
			CO4	reported by the compilers
			CO5	Identify and correct logical errors
			005	encountered at run time
	9FC61			Write iterative as well as
			CO6	recursive programs
	-		-	Represent data in arrays, strings
			CO7	and structures and manipulate
			007	them through a program
				Declare pointers of different
			CO8	types and use them in defining
			008	self referential structures.
				Create, read and write to and
			CO9	from simple text files.
I-I & A22				nom simple text mes.
	9BC61	WORKSHOP/MANUFACTURING		
	90001		CO1	Use various types of conventional
		PROCESSES LAB		manufacturing Processes
				Manufacture components from
			CO2	wood, MS flat, GI Sheet etc. – hands
				on experience
				manufacturing of components by
				machining like shafts, holes &
			CO3	-
				threaded holes, surface finishing of
				components etc.
				Produce small devices / products
				/appliances by assembling different
				components
			CO4	
I-II& A22				
1	1	I		

9HC07	Engineering Physics		1.	Differentiate the wave and
		CO1		particle, de-Broglie matter waves-its experimental evidence, Schroedinger's wave concept and its application for a particle in one dimension box.
		CO2	2.	Explain about emission, its types, laser principle, types, working and its applications and to reveals about TIR principle, optical fiber-types and signal propagation, attenuation, communication system and applications of optical fibers (sensors and medical endoscopy)
		CO3	3.	Classify magnetism types, Hysteresis, domain theory, Anti- ferro and ferri-magnetism, Superconductivity, experimental facts, theoretical analysis, types of superconductors and its applications.
		CO4	4.	Explain the basic concepts of dielectric materials, polarization and its types, local fields, frequency and temperature effect on dielectrics and their applications (piezo, ferro and Pyro electricity).
		CO5	5.	Elaborate semiconductor behavior, types, carrier concentration, Hall effect, Thermistor, demonstrate and analyze semiconductor devices like a PN-junction, I-V characteristics, LED, solar cell, photo diode and their applications.
		CO6	6.	Summarize nano& bulk concepts, surface to volume ratio, quantum confinement, CNTs and preparation methods (physical & chemical), analysis the techniques like XRD, SEM,

			TEM and also to understand the radioactivity, fusion & fission, alpha, beta and gamma rays decay and its applications.
9EC01	Data Structures	CO1	1 Demonstrate the concepts of Abstract data type and also applications of stack and Queues
		CO2	2 Select the data structure that efficiently model the information in a problem
		CO3	3 Design programs using variety of data structures including Trees, AVL Trees and Graphs and their applications.
		CO4	4 Solve problems and also assess efficiency trade off among searching and sorting using time complexity of each algorithm and also the applications of hashing and hash tables.
		CO5	5 Describe the concepts of OOPs and implement programs using objects, classes, constructors and destructors.
		CO6	6 Apply concepts of OOPs to write program on over loading functions and concepts of inheritance.
9HC12	ADVANCED CALCULUS	CO1	<ol> <li>Find the limits and test for the continuity and differentiability of a function.</li> </ol>
		CO2	<ol><li>Solve the problems on multiple integrals.</li></ol>
		CO3	3. Solve linear and nonlinear first order partial differential equations.
		CO4	4. Find Series expansion a function defined over the intervals.
		CO5	5. Find directional derivative, gradient, divergence and curl of a function.
		CO6	6. Solve problems of line, surface and volume integrals.
9BC01	ENGINEERING GRAPHICS		<ol> <li>Get familiar to use the instruments to solve the engineering problem and</li> </ol>

	[			[
				draw various type of curves
				used in engineering
				2) Understand Orthographic
				projections and draw
				projections of simple drawing
				entities such as points Lines.
				3) Draw projections of different
				types of regular Planes, solids
				•
				principal planes of projection.
				4) Draw Sections of various
				Solids including Cylinders,
				cones, prisms and pyramids
				and draw the developments
				of these solids and their
				sections.
				5) Construct Isometric Scale,
				Isometric Projections and
				Views.
				6) Convert Isometric to
				orthographic views and
				understand basic sketching
				-
				using computer aided design
	0.000			(CAD) software.
	9AC48	Basic electrical and electronics	CO1	1. Understand the fundamentals of electrical engineering and DC
		Engineering	01	machines.
		Lingineering		2. Understand the principles of AC
			CO2	circuits.
				3. Understand the principle and
			CO3	operation of three phase induction
				motor and measuring instruments.
			CO4	4. Understand the principle and
				operation of diode.
			CO5	5. Understand the principle and
				operation of transistor. 6. Understand the principles of digital
			CO6	electronics.
	9HC62	Oral Communication Lab - II		• Understand the nuances of
			CO1	striking a great conversation in
			CO1	formal and informal situations.
				• Gain experience of facing an
			CO2	audience and speaking in public.
				Design a winning presentation
			CO3	• Design a winning presentation
				and present it with ease.
L	1			1

 9HC66	Engineering Physics Lab	CO1 photo elec	hoto current,
		CO2 • Know about properties-disp spectrometer deviation arran	ersion, prism, and minimum
		• Recognize the between the and diffraction characteristics.	
		• •	fundamentals, perture its ttenuation in
		Understand a apply the fur magnetic Ampere's law, and the Biot-Sa	ndamentals of induction, Oersted's law
		CO6 AC and DC	on, resonance,
		Analyze the combination, pelectrical inductance, capacitance a and electronic for the combination of th	resonance, reactance, and electrical
		• Summarize the of modulus-t strain, elastic and Hook's law	ypes, stress, ity, plasticity
		Analyze the semiconductor calculation of e semiconductor importance.	nergy gap of a
		CO10 • Analyze the	difference

				between normal diode, LED, forward bias, reverse bias, I-V characteristics, direct and indirect band gap semiconductors.
			CO11	<ul> <li>Characterize the RC network, time constant, capacitor functioning and its application.</li> </ul>
			CO12	<ul> <li>Understand the concept of radiation, ionizing radiation, radiological protection and inverse square law.</li> </ul>
9EC	61 D.	OATA STRUCTURES Using C Lab	CO1	<ol> <li>Implement Stacks, Queues and circularqueues.</li> </ol>
			CO2	2 Write programs using tree traversals. In-order, preorder and post-order.
			CO3	3 Program searching, sorting and hashing operations.
			CO4	4 Write programs on Binarytrees
			CO5	5 Implement classes and operatoroverloading.
				·

Year and regulation	Course code	Course name	Co's	
			CO1	1. Solve the random variable problems and probability distributions.
			CO2	2. Estimate the parameters and solve the problems using central limit theorem.
	8HC16		CO3	3. Test the hypothesis related to samples concerning to the means and proportions of large size samples.
			CO4	4. Apply and solve the problems using t-test, Chi-square test also testing the hypothesis problems on small size samples, goodness of fit and independence of attributes.
			CO5	5. Solve the problems on measures of central tendency, Correlation

				Classify and differentiate minute
			CO6	Classify and differentiate various regression models
II-I & A20		ELEMENTS OF ELECTRICAL & ELECTRONICS	CO1	1. Understand the fundamentals of electrical engineering and DC machines.
		ENGINEERING	CO2	2. Understand the principles of AC circuits.
	8AC48		CO3	3. Understand the principle and operation of three phase induction motor and measuring instruments.
			CO4	4. Understand the principle and operation of diode.
			CO5	5. Understand the principle and operation of transistor.
			CO6	6. Understand the principles of digital electronics.
		OBJECT ORIENTED PROGRAMMING THROUGH JAVA	CO1	1 Understand and comprehend the fundamentals of JAVA, its Classes, and Objects and write simple programs using constructors.
	8EC02		CO2	2 Write programs using inheritance, interface and packages.
			CO3	3 Implement programs using Packages, I/O Stream and collections.
			CO4	4 Implement Exception handling and Multithreading.
			CO5	5 Design programs using AWT, Swings and develop applications using event handling.
II-I & A20			CO6	6 Develop applications using Applets and develop client server programs using networking concepts.
		Discrete Mathematics	CO1	Evaluate elementary mathematical arguments and identify fallacious reasoning (not just fallacious conclusions).
	8F303		CO2	Reason about arguments represented in Predicate logic.
			CO3	Perform operations on discrete structures such as sets, functions, relations, and sequences.
			CO4	Solve discrete mathematics problems

				that involve: computing permutations and combinations of a set.
			CO5	Analyze and deduce problems involving recurrence relations and generating functions.
			CO6	Apply graph theory models of data structures and state machines to solve problems of connectivity and constraint satisfaction, for example, scheduling
		Computer Organization and Architecture	CO1	1. Perceive basic operational concept of computer and data processing.
			CO2	<ol> <li>Use data types with instruction set of specified architecture</li> </ol>
	8DC10		CO3	3. Justify different control unit design and algorithms for various operations.
			CO4	4. Elaborate basic architecture of 8086 processor
			CO5	5. Write assembly language programming and debug to 8086
			CO6	6. Interface devices to 8086 processor.
		Software Engineering	CO1	<i>(i) Apply process models in real</i> <i>world software products.</i>
			CO2	(ii) Classify software requirement specification document.
	8D310		CO3	(iii)Design system models and user interface.
			CO4 CO5	(iv)Evaluate test strategies for various softwares.
			CO5	(v) Describe product metrics, risks. (vi) Understand the quality management.
		Universal Human values	C01	Recognizing the significance of value education and Understand the way to have continuous happiness and prosperity
II-I & A20	8HC17		CO2	Distinguish between the Self and the body to realize the meaning of harmony for co-existence of Self and body

		CO3	Appreciating the value of harmonious relationship based on trust, respect and other naturally acceptable feelings in human- human Relationship
		CO4	Recognize the need of harmony in nature and existence, and work out their mutually fulfilling participation in the nature with
		CO5	Practice natural acceptance and implement and collaborate ethical human conduct
		CO6	Understand and Apply harmony in professional ethics
	Object oriented Programming through Java Lab	CO1	1 Write programs to generate Prime numbers, Roots of quadratic equation and Fibonacci series.
		CO2	2 Write small application such as banking system.
8EC62		CO3	3 Write programs on operator, function overloading and dynamic method dispatch.
		CO4	4 Write programs to implement interface and packages.
		CO5	5 Explain and write programs to implement threads.
		CO6	6 Write programs to implement applets and event handling.
8EC77	Software Engineering and Computer Organization Lab	CO1	Identify software process and software engineering practices to select and justify approaches for a given project and its constraints and distinguish life cycles for developing software product. Appraise the importance and principles of Unified Modeling Language, its building blocks and to relate UML paradigm for problem solving. Define and design models for the requirements stated
			in the software project. Design

II-I & A20			CO2	class, object and interactive diagrams and know their significance. Design advanced behavioral and architectural modeling and work on case studies. Appraise the architecture of 8086 processor, assembling language programming and interfacing with various modules. Experiment with Arithmetic operations of binary number system. Simulate any type of VLSI, embedded systems, industrial and real time applications by knowing the concepts of Microprocessor and Microcontrollers.
II-I& A20				
	8AC77	Elements of Electrical and Electronics Engineering Lab	CO1	Understand the working of single- phase transformer under different conditions, the performance of three phase induction motor, different speed control methods of DC motor with and without loading with its performance.
			CO2	Understand the applications of Thevenin's Theorem in circuit analysis.
			CO3	Identify, Specify and test R, L, C Components (Colour Codes), Potentiometers, Switches, Coils, Relays.
			CO4	Identify, Specify and test Active Devices, Diodes, BJTs, Low power JFETs.
			CO5	Explain and demonstrate working of PN Junction and Zener diode.
			CO6	Explain and demonstrate working Half and Full wave Rectifier without filters.
			CO7	Demonstrate working of CE characteristics and its application as an amplifier.
II-I& A20	8I378	Comprehensive Test and Viva- Voce - III	CO1	1. Comprehend the concepts in the Core Courses 1 <sup>st</sup> yearand 2 <sup>nd</sup> year 1 <sup>st</sup> Semester.
			CO2	2. Assess technical

				knowledge to face
				interviews.
			CO3	3. Exhibit lifelong learning skills to pursue higher studies or professional practice.
	8I386	Technical Seminar – III	CO1	Identifycurrentgeneral, political and technologyrelatedtopics.
			CO2	Arrange and presentseminar in a effective manner
			CO3	Collect, survey and organize content in presentablemanner
			CO4	Demonstrateoratoryskills with the aid of Power Point Presentations
			CO5	Exhibit interview facingskills and team leadingqualities
II-II& A20	8E445	Introduction to IOT	CO1	Understand the concepts of Internet of Things
			CO2	• Analyze basic protocols in wireless
				sensor network
				• Design IoT applications in different
			CO3	domain and be able to analyze their
				performance
			CO4	• Implement basic IoT applications on
			CO4	embedded platform
			CO5	Understand the concepts of Internet of
				Things
			001	• Analyze basic protocols in wireless
			CO6	sensor network
	8EC05	Data Communications and Networks	CO1	Identify the different types of network topologies and protocols useful for real time applications and transmission medias.
			CO2	Discuss design issues of data link layer and solve problems on Checksum and flow control.
			CO3	Describe Channel allocation issues, MAC protocols such as ALOHA, CSMA and CSMA/CD and MAC addresses with IEEE 802.X and wireless LAN.

				Discuss network layer design issues,
			CO4	routing algorithms and Internetworking concepts.
			CO5	Discuss network layer sub netting concepts, its protocols of control and congestion and QOS.
			CO6	Describe concepts and services and protocols of transport, Application layers
II-II& A20	8EC03	Database Management Systems	CO1	1. Comprehend importance, significance, models, Database languages, architecture and design of DataBaseSystems.
			CO2	2. Design Relational Models and apply Integrity Constraints, Querying fundamentals, Logical data base Design and Views of databases along with application of Relational Algebra.
			CO3	3. Apply queries in SQL Query using Nested Queries Set, Comparison Operators, Aggregative Operators, Logical connectivity's with Joins statements and develop applications.
			CO4	4. Eliminate data redundancy through normalforms.
			CO5	5. Ensure ACID properties and Serializability in Transaction management and Database Recovery.
			CO6	6. Use different External Storage Organization techniques and apply Indexing in databases to enhance systemperformance.
	8EC06	Operating Systems	CO1	1. Describe the basic functionalities and structure of the Operating System
			CO2	<ul> <li>2. Explain the concepts and implementations of: Processes, Process Scheduling. Describe, contrast and compare various types of Operating systems like Windows and Linux.</li> </ul>
			CO3	3. Comprehend the concepts of Synchronization and Deadlocks in

				the Operating System
			CO4	4. Discuss the concepts of Memory Management(Physical and Virtual memory)
			CO5	5. Explain the concepts of File System with regard to directory and disk management algorithms.
			CO6	<ol> <li>Students understand the concepts of I/O systems, protection and security</li> </ol>
	8CC55	Digital Electronics	CO1	1. Apply the rules of Boolean algebra to simplify Boolean expressions.
			CO2	2. Simplify of Boolean expressions using K-map.
			CO3	3. Design MSI combinational circuits such as full adders, multiplexers, decoders, encoders. Code converters.
			CO4	<ul> <li>4. Design basic memory units (latches and flip-flops) and sequential circuits such as counters and registers</li> </ul>
			CO5	5. Create digital design using PLD's such as ROM's, PLA's, PAL s.
II-II&			CO6	6. Design the digital controllers using Algorithmic State Machine Charts.
A20	8ZC01	Economics, Accountancy and Management Science	CO1	1. Acquire the basics of Managerial Economics at Micro level, Demand analysis and production analysis in particular.
			CO2	2. Gain exposure on Cost concept, Revenues and Market structure and describe the concepts.
			CO3	3. Comprehend the basic concepts of Accounting, Double entry system and Bookkeeping.
			CO4	4. Interpret the concepts of Capital expenditure, Revenue expenditure and Final accounts ad their significance.
			CO5	5. Gain knowledge and elaborate the basics of Management, its principles and various functions performed in organization.
			CO6	6. Recognize various personality traits, perception, attitudes of individuals working in

				organization.
			CO6	Learn and implement policy to protect the environment
	8EC63	DATABASE MANAGEMENT SYSTEMS LAB	CO1	• Create tables for a database and apply Queries using ANY, ALL, IN, EXISTS,
			CO2	• NOTEXISTS, UNION, INTERSET, Constraints.
			CO3	• Write Queries using Aggregate functions such as [COUNT, SUM, AVG, MAX, MIN,
			CO4	• GROUP BY, HAVING], Conversion functions and use string functions for a given
			CO5	• application.
			CO6	• Explain and write programs using PL/SQL programs using exceptions, COMMIT,
II-II& A20			CO7	ROLLBACK and SAVEPOINT in PL/SQL block.
			CO8	• Develop programs using WHILE LOOPS, FOR LOOPS, nested loops using BUILT-
			CO9	• IN Exceptions and write Procedures.
			CO10	• Write Programs for stored functions invoke functions in SQL Statement and write
			CO11	• Programs for packages specification.
			CO612	• Describe and write programs using features of CURSORs and its variables.
			CO13	Develop Programs implementing Triggers
	OPERATING SYSTEMS AND COMPUTER NETWORKS LAB		CO1	Simulate and implement operating system concepts such as scheduling, deadlock management, page replacement techniques, file management and memory management

		Computer Networks Lab	CO1	1. Implement and analyze framing methods of the data link layer.
			CO1	2. Implement and analyze framing methods of the data link layer.
			CO2	Illustrate and implement error detection & correction techniques.
			CO3	Implement different Routing Algorithms.
			CO4	3. Understand basic Network Commands.
			CO5	4. Demonstrate the features of NS2 tool
		_	CO6	5. Implement and analyze framing methods of the data link layer.
	8EC79	Internet of Things LAB		
II-II& A20	8I479	Comprehensive Test and Viva Voce - IV	CO1	After completing this course, the student will be able to Comprehend the concepts in the Core Courses 1 st year and 2 nd year.
			CO2	Assess technical knowledge to face interviews.
			CO3	Exhibit life long learning skills to pursue higher studies or professional practice.
	8I487	Technical Seminar – IV	C01	Deliver lecture on emerging technologies.
	01107		CO2	Explain domain knowledge to resolve real time technical issues
			CO3	3Demonstrate ability to lead and explain concepts and innovative ideas.
			CO4	Demonstrate team leading qualities.
			CO5	Demonstrate public speaking and lifelong learning skills for higher studies and to pursue
			CO6	Exchange new information that would not have been available otherwise.
				Develop debating and interview skills.
III-I&	8FC06	Information Security	CO1	Understand the fundamental concepts of
A20	01,000	Information Security	COI	Security Attacks and security standards
				with the model for network Security.
			CO2	Review and analyze conventional cryptographic techniques and authentication
			CO3	Review and analyze public cryptographic techniques and outline the concepts of

				Kerberos and email privacy
			CO4	Recognize architecture, key management
			C04	and header formats of Ipsec
			CO5	Outline the various web security threats and protocols
			CO6	Understand Intrusion Detection System
			000	and Design principles of Firewalls
	81506	INTRODUCTION TO	CO1	Classify embedded systems and their
	01500	EMBEDDED SYSTEMS	COI	applications
		EMBEDDED STSTEMS	CO2	Write ALP for 8051 architecture
			CO3	3. Implement interfaces for Embedded
			COS	System using various protocols and
				hardware modules.
			CO4	Understand the principles of
			004	Communication Interface, Wireless and
				Mobile Systems Protocols
			CO5	Design the interrupt routines for variois
			005	OS concepts and Memory Management
				techniques in an RTOS Environment
			CO6	Recognize the issues and design of basic
			000	Real-Time Operating System principles,
				Semaphores and Queues, Hard Real-Time
				Scheduling Considerations.
	8EC07	WEB TECHNOLOGIES	CO1	Demonstrate the use of HTML tags.
				Apply Styles using CSS and Bootstrap.
				a. Develop dynamic programs using
				Javascript and Typescript.
				b. Develop scripts using XML and
				validate using parsers, Design a data-
				interchange
				format using JSON.
			CO2	Appraise the Expressions, Filters,
				Directives, Controller, and Modules of
				Angular.
			CO3	Design responsive web applications with
				Forms, Scope, Dependency Injection
				& Services, and Single Page
				Application (SPA) of Angular.
			CO4	Comprehend the uses of Web servers and
				design the server-side scripts using
			~~ `	Servlets.
			CO5	6. Design and develop server-side scripts
			~ ~ ~	and components using PHP.
			CO6	
	8EC16	INTRODUCTION TO DATA	CO1	Understand basic terms what Statistical
		SCIENCE		Inference means. Identify probability
1				distributions commonly used as

			foundations for statistical modeling. Fit a model to data
		CO2	Discuss the significance of exploratory data analysis (EDA) in data science and to apply basic tools (plots, graphs, summary statistics) to carry out EDA
		CO3	Apply basic machine learning algorithms and to identify common approaches used for Feature Generation
		CO4	Analyze fundamental mathematical and algorithmic ingredients that constitute a Recommendation Engine and to Build their own recommendation system using existing components
8HC05	Environmental Science and Ecology	CO1	Understand about ecosystem and energy flow among the organisms.
		CO2	Know the resources available, use of them and overexploitation of the resources in the nature.
		CO3	Learn the value, use and value of biodiversity.
		CO4	Understand the causes and effect of pollution and implement measures in control of pollution.
		CO5	Understand the sustainable development and implement green technology for sustainable development.
		CO6	Implement policy to protect the environment.
8EC67	WEB TECHNOLOGIES LAB	CO1	Demonstrate the use of HTML tags and be able to design web pages. Develop dynamic
			programs involving Java scripts, popup windows in JavaScript along Event Handling.
		CO2	Develop scripts using XML and XSLT and read XML documents using parsers, DOM parser, and SAX parser. Develop JSON files
			and SAX parser. Develop JSON files and access them via HTML pages.
		CO3	Implement Angular with Expressions,

				Filters, Directives, Controller, and Modules.
			CO4	Develop a Single Page Application with
			0.04	implementation of Scope and Form.
			CO5	Implement Java servlets using Apache
			005	Tomcat Server for User authentications
			CO6	Develop an application in PHP with
			000	Database connectivity.
III-I-	8FC65	Information Security Lab		Understanding of Symmetric Encryption
&A20	01 005	Information Security Lab		Algorithms, Asymmetric Encryption
<b>C</b> (120				Algorithms, Hash and
				Key Exchange, Digital Signature and Digital
				Envelope, Demonstration of NS3 Tool
	81595	SUMMER INDUSTRY	CO1	Use the concepts learned in the courses,
	01070	INTERNSHIP-I	001	so far, in conceptualizing, designing and
				executing the modules of the projects
			CO2	. Exhibit the interest in learning the
				modern tools and technologies through
				the bridge courses arranged in the
				college, beyond the curriculum, and
				hence developing the software.
III-II-			CO3	Inculcate an enthusiasm to use the
&A20				creative ideas to build the innovative
				projects and
				prototypes which are meeting the current
				needs of the market and society as a
				whole.
			CO4	Improve their communicative skills and
				team skills.
	8I510	IOT Security	CO1	Describe IOT features and discuss IOT
				related protocols
			CO2	Classify IOT attacks and recommend
				counter measures
			CO3	Implement IOT Lifecycle for a project
			CO4	Examine various cryptographic protocols
			CO5	Access Privacy challenges and mitigate
			CO6	Examine compliance standards for IOT
				infrastructures
	8DC05	Microprocessors and	CO1	Understanding the concepts of 8086
		Microcontrollers		Architecture
			CO2	Understanding the concepts of
				Instruction set & amp; developing skills in
				writing assembly language programs.
			CO3	Ability to interface keyboard, stepper
				motor ADC, DAC to 8086 using 8255
			CO4	Understanding the concepts of 8051
				Architecture
			CO5	Exploring the concepts of instruction set
				of 8051

		CO6	Ability to interface LED, LCD, Keyboard DAC, ADC with 8051
8IC07	Introduction to Linux Programming	CO1	List and demonstrate the basic Linux utilities
		CO2	Recite and solve problems using Shell Scripting
		CO3	Understand and elaborate File System structure and kernel support for files in Linux.
		CO4	4. Summarize the fundamentals of process control primitives and signal handling.
		CO5	Classify the techniques of Inter process communication and apply them to real world problems.
		CO6	Demonstrate the significance of Semaphores for Kernel support and simulate program using the same.
8LC01	Introduction to Artificial Intelligence	CO1	Ability to formulate an efficient problem space for a problem expressed in natural language.
		CO2	Select a search algorithm for a problem and estimate its time and space complexities.
		CO3	Possess the skill for representing knowledge using the appropriate technique for a given <a>T</a> problem.
		CO4	Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.
8FC07	Automata Theory and Compiler Design	CO1	Design the finite automata different Languages
		CO2	Construct finite Automata for a given regular expressions, and derive strings with suitable examples. Conceptualize context free grammars and normal forms.
		CO3	Design the push down automata and Turing Machine for complex languages.
		CO4	Understand LEX tool and relate parsing techniques,
		CO5	Demonstrate and solve problems on SLR, CLR, LALR, operator precedence parser, LR (O), LR(1), LR(K) grammar and use YACC tool.
		CO6	Understand Semantic Analysis concepts to design compiler: and describe Intermediate code generation such as 3-address code form.

<b></b>	00040		001	Description is a large dub of the second state of the
	8GC49	INTELLECTUAL PROPERTY RIGHTS	CO1	Demonstrate a breadth of knowledge in Intellectual property
			CO2	Overview of Patents, Searching, filling and drafting of Patents
			CO3	Overview of copyright & amp; GI .
			CO4	Overview of Trade Mark & amp; Trade
			001	Secret,
			CO5	Overview of Integrated Circuit and
				Industrial Design.
			CO6	Knowledge about different national and
				international: Conventions and Treaties
				Governing the IPRs
	8IC61	Programming Using Linux -	CO1	To understand how to work with Linux
		Lab		commands for handling files, processes,
				text utilities, backup and network utilities.
			CO2	To explore basics of building shell scripts
				gain knowledge to compose various Shell
				Scripts.
			CO3	To learn and demonstrate the I/O
				functions, low-level system calls System
				Calls available for file and directory
			<u> </u>	handling.
			CO4	. To gain knowledge in implementing
				processes aspects, mastering the process APIs.
			CO5	To understand how to implement pipes,
				FIFO, how to use for communication
				purpose in IPC.
			CO6	To understand the significance of
				Semaphores for Kernel support and
				simulate program
				using the same
	8DC66	MICROPROCESSORS AND	CO1	Analyze and apply working of 8086.
		MICROCONTROLLERS	CO2	Compare the various interface
		LAB(MPMC)		techniques. Analyze and apply the
				working of 8255, 8279,8259, 8251, 8257
				ICs and design and develop the programs
			CO3	Learning the Communication Standards
	8I680	COMPREHENSIVE VIVA	CO1	Assessed the knowledge of the students
		VOCE		in the Core and Elective subjects that they
				have studied till
	01/01		CO1	the completion of that academic year.
	81691	GROUP PROJECT	CO1	Use the concepts learned in the courses,
				so far, in conceptualizing, designing and
			CO2	executing the modules of the projects. Exhibit the interest in learning the modern
				tools and technologies through the bridge
				courses arranged in the college, beyond
				Courses an anged in the college, beyond

				the curriculum, and hence developing the software.
			CO3	3. Inculcate an enthusiasm to use the creative ideas to build the innovative projects which are meeting the current needs of the market and society as a whole.
			CO4	Improve their communicative skills and team skills largely improve.
III-II-A20			CO5	Work as an individual and in a team.
	8I612	Introduction To Ethical	CO1	1. Discuss Ethical hacking primitives
		Hacking	CO2	Use ethical hacking to deal with foot printing and social engineering
			CO3	Justify Network Scanning and system security
			CO4	Apply Rootkits and sniffers to gather information from the network and develop a Security model
			CO5	Apply techniques to counter Web Hacking and Vulnerabilities.
			CO6	Justify Wireless Network Hacking and physical site security



## Course Outcomes of MBA Department

SREENIDHI INSTITUTE OF





## Department of MBA - Master of Business Administration COs for A22-1st Year, A20-2nd and 3rd year, A18-4th Year courses/subjects

Course	Course name		Co's
code		CO1	Exposure to evolution of management and managerial role and responsibilities
		CO2	Acquire the process of planning and decision making
8Z101	ORGANIZATIONALBEHAVIOUR	CO3	Acquire and gain the art of organizing and controlling the organization
		CO4	Exposure on organization behavior, groups, teams and building teams
		CO5	Identify different styles of leadership and different theories of motivation.
		CO6	Infer personality theories and stress Management
8Z102			Outline the objectives of accounting, its importance
	8Z102 FINANCIAL ACCOUNTING AND ANALYSIS	CO2	Apply the concepts of accounting for the preparation financial statements.
		CO3	Apply various methods for valuation of inventory and fixed assets
		CO4	Analyze the financial statements using cash flow and funds flow analysis statement's
			Analyze the financial statements using comparative, common size and ratios Explain the basic
	code 8Z101	code       Course name         code       MANAGEMENT AND         8Z101       MANAGEMENT AND         ORGANIZATIONALBEHAVIOUR         8Z102       FINANCIAL ACCOUNTING AND	code         Course name           code         col           acode         col           base         col

				computerized accounting concepts and its applications using Tally Software
			CO1	Acquire the knowledge relating to Managerial economics and its importance
			CO2	Outline meaning of demand and how it can be forecasted
	8Z103	MANAGERIAL ECONOMICS	CO3	Acquire knowledge regarding production function and returns to scale
			CO4	Infer meaning of cost and its determinants
			CO5	Examine market structures and pricing strategies for firms
			CO6	Outline profit theory and measurement
	8Z104	LEGAL AND ECONOMIC ENVIRONMENT OF BUSINESS	CO1	Explain the nature of contract and the essential elements of contract
			CO2	understanding Indian companies act
			CO3	Identify and understand the utility of different negotiable instruments alongside sales goods act and Central Excise act,
			CO4	Analyze the implications of business environment using the appropriate methods
			CO5	Infer and interpret the components of balance of payments and the recent trends
			CO6	Discover the WTO its structure and functions in governing and administering policy decisions
	8Z105	RESEARCH METHODOLOGY AND STATISTICAL ANALYSIS	CO1	Explain basic process of research and measurement

				of variables
			CO2	Explain the research design and types of research design
			CO3	Examine the types of data and evaluate using the sample tests
			CO4	Evaluate the variances using
			CO5	Explain the applications of time series analysis
			CO6	Equip with the art of research report writing
			CO1	Exposure to process of project management
		PROJECT MANAGEMENT	CO2	Acquire and Discover the project formulation, project rating preliminary report and feasibility report
	8Z106		CO3	Equip the techniques of project appraisal methods
			CO4	Discover project finance and project evaluation techniques
			CO5	Exposure on project control and techniques
			CO6	Discover the organization behavior in project management
			CO1	Acquire knowledge on sustainability management and sustainable business practices
			CO2	Discover planning methods for sustainability
			CO3	Equipping the method of integrating sustainability
	8Z107	SUSTAINABILITY MANAGEMENT	CO4	Gain knowledge on sustainability in functional areas
			CO5	Gain exposure on creating eco system for change and sustainability
			CO6	Discover sustainable entrepreneurship
	8Z108	<b>BUSINESS COMMUNICATION</b>	C01	Gain knowledge on basic

				communication skills
			CO2	Equipping with presentation skills and chairing meetings
			CO3	Acquire the skills in writing skills
			CO4	Articulate the method of writing business reports
			CO5	Gain exposure on employability skills
			CO6	Discover the contemporary aspects in communication
	8Z109		CO1	Outline the basic functions and features of Microsoft- Office.
			CO2	Infer the knowledge on functions of Excel Data Processing
		STATISTICAL DATA ANALYSIS LAB	CO3	Equip with data analysis chart and graphs for data analysis
			CO4	Gain knowledge on frequency descriptive analysis using spss
			CO5	Acquire knowledge on parametric tests using spss
			CO6	Acquire knowledge on non- parametric using spss
I-II & A22	8Z210		CO1	Gain the knowledge relating to profit & wealth maximization, time value of money
			CO2	Evaluate investment decisions
		FINANCIAL MANAGEMENT	CO3	Solve problems relating to capital structure and cost of capital
			CO4	Acquire knowledge relating to working capital
			CO5	Appraise about cash, receivables and inventory management
			CO6	relating to dividends
	8Z211	HUMAN RESOURCE	CO1	Understand and Inculcate knowledge on Human Resource Planning and its

	MANAGEMENT		functions and policies
		CO2	Understand the basic knowledge about the Job analysis
		CO3	Develop the skills required for Recruitment process at the work place
		CO4	Excel the skill required for effective training and Appraisal of the employee at the work place
		CO5	Understand the concept of
		CO6	Develop negotiation skills for handling Industrial Disputes and grievances
8Z212		CO1	Gain exposure on Marketing functions and process
		CO2	Disseminate and apply STP analysis
		CO3	Discover different types of product decisions
	MARKETING MANAGEMENT	CO4	Exposure on various types of pricing decisions
		CO5	Equip with the strategies of
		CO6	Discover the rising growth
8Z213		CO1	Outline the Nature of Entrepreneurship
		CO2	Explore customer analysis and finding opportunities
		CO3	Discover and evaluate different business models and validation
	ENTREPRENEURSHIP AND DESIGN THINKING	CO4	Identify MVP using economic and financial analysis
		CO5	Discover the process and types of Innovation
		CO6	outline the process of design thinking

8Z214	8Z214	CO1	Acquire knowledge relating to operations research and areas of its application
		CO2	Gain knowledge relating to linear programming and its application
	QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS	CO3	Solve problems relating to transportation and assignment
		CO4	Acquire knowledge relating to decision theory and its applications
		CO5	Solve problems relating to game theory
		CO6	Solve problems relating to queuing theory
8Z215		CO1	Inculcate knowledge on industry operations with respect to production
	OPERATIONS MANAGEMENT	CO2	Develop in-depth knowledge on optimum utilization of resources in Operations
		CO3	Outline the concepts of global procedures with respect to scheduling
		CO4	Summarize the importance of materials & stores management with respect to production
		CO5	Inculcate and enlighten on quality management techniques and create
		CO6	Explain the project management techniques
8Z216		CO1	Acquire knowledge relating to Business and professional ethics
	BUSINESS ETHICS & CORPORATE GOVERNANCE	CO2	Outline Legal & environmental aspects of ethics
		CO3	Outline the ethical practices in Business Management
		CO4	Acquire knowledge relating to corporate governance
		CO5	Gain exposure in code of

				corporate governance
			CO6	Explore and gain knowledge
	8Z217		CO1	Gain exposure on Drivers of globalization WTO and its implications
			CO2	Outline the international trade theory
		INTERNATIONAL BUSINESS	CO3	Acquire knowledge on entering in international business strategy and management
			CO4	Equipping with global marketing strategies and R & D
			CO5	Outline the concept of financial management in international business
			CO6	Enlighten in the area of FDI and its importance in India
	8Z218		CO1	Identify the need for Quality Management in a business organization.
			CO2	Develop proficiency in various quality control techniques and methods to ensure customer satisfaction
		TOTAL QUALITY MANAGEMENT	CO3	Acquire knowledge on TQM methodologies and benchmarking
			CO4	Discover the cost of quality and the role of business process reengineering
			CO5	Apply the principles of TQM in service sector
			CO6	Examine the need for ISO standards and their benefits
II-I(A19)	7Z321		CO1	Explain the key concepts and process of Strategic management.
		STRATEGIC MANAGEMENT	CO2	Analyze different models and techniques of strategic formulation
			CO3	Outline various levels of strategic analysis and different types of strategies

		CO4	Evaluate the relationship between strategy, organization structure, leadership, organizational values in a global perspective
		CO5	Explore strategies for operational zing and institutionalizing strategy
		CO6	mechanisms
7Z32	22	CO1	Acquire the knowledge relating to Management accounting and cost analysis
		CO2	Prepare students to analyze cost sheet
		CO3	Acquire knowledge regarding Marginal costing
	COST MANAGE ACCOUNTIN		Apply knowledge of marginal costing to solve business problems
		CO5	Appraise about budget preparation and budgetary control.
		CO6	Know about standard costing and its application
7Z32	23	CO1	Explain the nature of contract and the essential elements of contract
		CO2	understanding Indian companies act
	LEGAL AND ECON ENVIRONMENT OF B		Identify and understand the utility of different negotiable instruments alongside sales goods act and Central Excise act,
		CO4	Analyze the implications of business environment using the appropriate methods
		CO5	Infer and interpret the components of balance of payments and the recent trends
		CO6	Discover the WTO its

			structure and functions in governing and administering policy decisions
7Z324		CO1	Acquire knowledge relating to operations research and areas of its application
		CO2	Gain knowledge relating to linear programming and its application
	QUANTITATIVE ANALYSIS FOR BUSINESS DECISIONS	CO3	Solve problems relating to transportation and assignment
		CO4	Acquire knowledge relating to decision theory and its applications
		CO5	Solve problems relating to game theory
		CO6	Solve problems relating to queuing theory
7Z325		C01	Acquire knowledge relating to investments and about securities market
	SECURITY ANALYSIS AND	CO2	Analyze investments based on fundamentals and calculate intrinsic value
	PORTFOLIO MANAGEMENT	CO3	5
		CO4	Understand equity valuation models
		CO5	Acquire knowledge relating to Portfolio management
		CO6	Evaluate Portfolio performance and revision
7Z326		CO1	Identify the basic concepts of consumer behavior
		CO2	Explore the process of formation of consumer attitude, learning and perception
	CONSUMER BEHAVIOUR	CO3	Examine the environmental influences on consumer behavior
		CO4	Examine the consumer decision making
		CO5	Analyze the consumer behavior models

			Identify the need of
		CO6	studying consumer protection laws
7Z32	7	CO1	Identify the basic concepts of performance management
		CO2	Examine the process of employee appraisal and feedback mechanism
	PERFORMANCE MANAGEMENT AND COUNSELING	CO3	Analyzing the methods of performance appraisal and understanding benchmarking
	COUNSELING	CO4	Apply the performance metrics and models
		CO5	Outline the counseling process
		CO6	Analyze the relation between counseling and performance management
7Z328	3	CO1	Identify and understand the need of preparing business plan and feasibility
		CO2	Create a marketing plan for appropriate launch of the business in the market
	BUSINESS PLAN PREPARATION AND MODELS IN ENTREPRENEURSHIP	CO3	Infer and acquire the knowledge pertaining to production and operations management
		CO4	Identify the importance of social entrepreneurship
		CO5	Create business models and lean canvas models
		CO6	Analyze the business conditions in selection of business structure
7Z329	)	CO1	Understand the structure of financial system
	FINANCIAL INSTITUTIONS, MARKETS ANDSERVICES	CO2	Identify various banking institutions and their policies
		CO3	Exploring the NBFC and their functions
		CO4	Understand the financial and securities market
		CO5	Outline the asset and fund

			based financial services
		CO6	Learn the investment and merchant banking
7Z330		C01	Explore the basic concepts related to services marketing
		CO2	1 7
		CO3	Ŭ
	SERVICES MARKETING	CO4	develop blueprint and decide on appropriate pricing
		CO5	Identify the various distribution
		CO6	of services
7Z331		CO1	Outline the concept of Training and its implementation in organizations
		CO2	Inspect the Training needs and developing the Training process
	TRAINING AND DEVELOPMENT	CO3	Build Training designs and Explain various methods of Training
		CO4	Explain the Measuring of a training program
		CO5	Explain various areas of organizational training
		CO6	Examine the Strategic training
7Z332		CO1	Explore the various business models
		CO2	Identify the resources in helping in the formation of a startup
	STARTUP MANAGEMENT AND	CO3	Analyze the lean startup method
	SUSTAINABILITY	CO4	Explore growth strategies
		CO5	Identify the various startup sustainable strategies
		CO6	Identify startup sustainable strategies
7Z333	STRATEGIC INVESTMENT AND	CO1	Identify and understand the

	FINANCING DECISIONS		different means of
			investment and
			disinvestment
			Assessing the risk
		CO2	components by applying the capital budgeting techniques
		CO3	Assessing the risk related to investment decisions
		CO4	Examining the critical analysis of project appraisal techniques
		CO5	Exploring investment decisions under capital constraints
		CO6	Asses and understand the management of risk
7Z3	34	CO1	Identify the basic concepts of Retailing Management
		CO2	Analyze the consumer behavior in retailing malls and their experiences
		CO3	Create value through various formats of Retailing
	RETAILING MANAGEMENT	CO4	Evaluate the linkages between supply chain management and Retailing
		CO5	Explore the various types of retail layouts and arrangement of merchandize
		CO6	Identify the role of
7Z3	35	CO1	Acquire the process of Managing strategic change process
		CO2	Implement the change and assessing the results thereof
	LEADERSHIP AND CHANGE	CO3	Identify methods of change management
	MANAGEMENT	CO4	Acquire the theories of leadership
		CO5	Examine the leadership transformation process
		CO6	Explore and analyze the traits required for development of good leadership

	7Z336			Explore the various business
	12550		CO1	models helping in the formation of a startup
			CO2	Analyzing the process of starting an enterprise and its environment
		TECHNOLOGY FOR	CO3	Analyze the lean startup method and its limitations
		ENTREPRENEURSHIP AND INTELLECTUAL PROPERTY RIGHTS	CO4	Explore the various opportunities for the growth and development of a startup
			CO5	Infer the importance of sustainability and guiding principles of sustainability
			CO6	Identify the various startup sustainable strategies
	7Z338		CO1	Outline series completion and direction sense test and puzzle test
		QUANTITATIVE APTITUDE AND LOGICAL REASONING	CO2	Learn data sufficiency and venn diagrams
			CO3	Understanding HCF and LCM
			CO4	Understand ratios and proportions
			CO5	Explore the simple interest and compound interest computation
			CO6	Understanding area of plane figures
II-II & A19	7Z439		CO1	Acquire the concept of business intelligence and its evolution
			CO2	Analyze the significance of business analytics and its relations with organization decision making methods
		BUSINESS ANALYTICS	CO3	Acquire the knowledge related to data warehousing and its architecture
			CO4	Outline the importance of data mining and its applications
			CO5	Analyze the descriptive models through R software
			CO6	Make use of big data in

			measuring the business performance
7Z440		CO1	Understanding the fundamentals of derivatives
		CO2	Learn Futures and Forward Markets
	MANAGEMENT OF DERIVATIVES	CO3	Explore the differences between options and futures
		CO4	1 2
		CO5	Understand commodity market derivatives
		CO6	risk
7Z441		CO1	Learn the basic product concepts
		CO2	Explore the strategies of Product Positioning
	PRODUCT AND BRAND MANAGEMENT	CO3	Outline the strategies of Packaging and support service
	MANAOEMENT	CO4	Understanding Brands and its significance
		CO5	Exploring the concept of Brand Awareness
		CO6	Understanding Brand Equity
7Z442		CO1	Understanding the concept of industrial relations and trade union act 1926
		CO2	Exploring the framework of collective bargaining
	MANAGEMENT OF INDUSTRIAL	CO3	Learn the labor legislation and factories act 1948
	RELATIONS	CO4	Understand the labor legislation and wage regulation
		CO5	Learn employee empowerment and quality of work life
		CO6	Exploring the contemporary issues in industrial relations
7Z443	ENTREPRENEURIAL	CO1	Explore the various avenues of entrepreneurial financing sources and types of entrepreneurship
	FINANCE	CO2	Explain and outline methods

			and principles of financial
			forecasting Develop and create a
		CO3	financial model with reference to certain
		CO4	assumptions Evaluation of new business ventures using different valuation techniques
		CO5	Assess and measure the current condition of venture and identify future financial needs
		CO6	Identify different methods
7Z444		CO1	Understanding the structure of behavioral finance
		CO2	Learning the history of behavioral finance and incorporating behavior into the asset allocation process
		CO3	Identify the investor biases
	BEHAVIORAL FINANCE	CO4	Learning different types of Investor biases
		CO5	Exploring the different types of bias and diagnosis testing
		CO6	Exploring the concept of neuroeconomics
7Z445	Z445 CUSTOMER RELATIONSHIP MANAGEMENT	CO1	Exploring the process of CRM
		CO2	Learning the application of CRM in Marketing
		CO3	Exploring the need of sales force automation
		CO4	Understanding the concept of analytical CRM
		CO5	Learning the CRM implementation
		CO6	relationships.
7Z446	TALENT AND KNOWLEDGE MANAGEMENT	C01	Outline the Evolution and importance of Talent Management
		CO2	Relate Talent management

			and employee engagement
		CO3	Explain the role of HR to Talent management
		CO4	Explain the concept and
		CO5	Summarize the Knowledge management framework
		CO6	Analyze the implementation of Knowledge management
7Z447		CO1	Identify the reasons of understanding the entrepreneurial marketing
		CO2	Identify business opportunities methods of understanding customer problems
		CO3	Develop a communication strategy to reach the appropriate target audience
	ENTREPRENEURIAL MARKETING	CO4	Analyze the Cost, production cost to reach a
		CO5	Explore the various
		CO6	Identify the need of maintaining customer relationship using the relevant methods
7Z448		CO1	Identify the nature and scope of International Financial Management and its recent trends in the growth of the Indian economy
	INTERNATIONAL FINANCIAL MANAGEMENT	CO2	Examine the application of exchange rate system by following FEDAI regulations and role of RBI
		CO3	Provide awareness on the utility of currency derivatives and their impact on cash management
		CO4	-

			hedging as a risk
			management tool in foreign currency payables.
		CO5	Know the benefits of Interest Rate Parity and Purchasing Power Parity in real exchange rate.
		CO6	Examine the capital structure of International Financial Management
7Z449		CO1	Identify the various trends in digital marketing strategies
		CO2	Evaluate the appropriate means of digital marketing channel
	DIGITAL MARKETING	CO3	Explore the various segments to reach the customers and retain the customers
		CO4	Create digital marketing plan to execute the marketing objectives
		CO5	Analyze the search engine optimization and online advertising
		CO6	Infer the strength of social media and its role in marketing
7Z450		CO1	significant role played by HRD professionals
	Organizational Development	CO2	Design HRD programs and evaluate the effectiveness of designed HRD programs
		CO3	Understand recent HRD trends and applications
		CO4	Explain insights on concepts of Organizational development and role of top management in defining OD
		CO5	Develop intense knowledge related to various organizational interventions
		CO6	Analyze the interface

				between HRD and OD
	7Z451		CO1	Explore the forms of social entrepreneurship and basic traits of social entrepreneurship
	SOCIAL ENTREPRENEURSHIP	CO2	Identify different types and forms of social entrepreneurship	
		SOCIAL ENTREPRENEURSHIP	CO3	Create new business ventures and considering acquisition and franchising
		CO4	Discover the importance of sustainable development and its factors	
			CO5	Analyze critical factors for new venture development
			CO6	Analyze and monitor the challenges of social entrepreneurship