



SVR ENGINEERING COLLEGE

(Sponsored by Little Flower Educational Society, Approved by AICTE, Affiliated by JNTUA)

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COURSE OUTCOMES FOR THE ACADEMIC YEAR 2021-22

CIVIL ENGINEERING I & II SEM COURSE OUTCOMES for the Academic Year 2021-2022

S.NO.	Year /Sem	Course Name	Course Outcomes
1	II-I	Probability and Statistics for Civil Engineering (20A54301)	CO1: Understand the concepts of probability, sampling distributions, test of hypothesis and Curve fitting CO2: Explain the characteristics through correlation and regression tools. CO3: Apply Probability theory to find the chances of happening of events. CO4: Understand various probability distributions and calculate their statistical moments CO5: Solve the problems on testing of hypothesis on large samples and small samples and fitting of the curves
2	II-I	Advanced Strength of Materials (20A01301)	CO1: Determine deflection at any point on a beam under simple and combined loads CO2: Apply energy theorems for analysis of indeterminate structures CO3: Analyze indeterminate structures with yielding of supports CO4: Analyze beams and portal frames using slope deflection and moment distribution methods CO5: Analyze bending moment, normal thrust and radial shear in the arches
3	II-I	Fluid Mechanics and Hydraulic Machines (20A01302T)	CO1: Familiarize basic terms used in fluid mechanics CO2: Understand the principles of fluid statics, kinematics and dynamics CO3: Understand flow characteristics and classify the flows and estimate various losses in flow through channel CO4: Analyze characteristics for uniform and non-uniform flows in open channels. CO5: Design different types of turbines, centrifugal and multistage pumps
4	II-I	SURVEYING (20A01303T)	CO1: Calculate angles, distances and levels CO2: Identify data collection methods and prepare field notes CO3: Understand the working principles of survey instruments CO4: Estimate the volumes of earth work CO5: Able to use modern survey instruments

5	II-I	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (20A52301)	CO1: Define the concepts related to Managerial Economics, financial accounting and management
			CO2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO3: Apply the Concept of Production cost and revenues for effective Business decision
			CO4: Analyze how to invest their capital and maximize returns
			CO5: Evaluate the capital budgeting techniques. Develop the accounting statements and evaluate the financial performance of business entity
6	II-I	Basic Civil Engineering Laboratory (20A01304)	CO1: Identify tools and equipment used and their respective functions.
			CO2: Identify different types of materials and their basic properties
			CO3: Use and take measurements with the help of basic measuring tools/equipment
			CO4: Select proper tools for a particular operation.
			CO5: Select materials and tools to make a job as per given specification/drawing.
7	II-I	FLUID MECHANICS AND HYDRAULIC MACHINES LAB (20A01302P)	CO: By performing the various tests in this laboratory the student will be able to know the principles of discharge measuring devices and head loss due to sudden contraction and expansion in pipes and working principles of various pumps and motors
8	II-I	SURVEYING LAB (20A01303P)	CO: By performing the various tests in this laboratory the student will be able to know the principles of surveying in chain surveying, compass surveying, plane table surveying, leveling, theodolite surveying and total station
9	II-I	Application Development with Python (20A05305)	CO1: Identify the issues in software requirements specification and enable to write SRS documents for software development problems
			CO2: Explore the use of Object oriented concepts to solve Real-life problems
			CO3: Design database for any real-world problem
			CO4: Solve mathematical problems using Python programming language
10	II-I	Universal Human Values (20A52201)	CO1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
			CO2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind
			CO3: They would have better critical ability.
			CO4: They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
			CO5: It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction

11	II-II	Mathematical Modeling & Optimization Techniques (20A54401)	CO1: Know about the classifications and stages of mathematical modeling
			CO2: Understand building of mathematical models
			CO3: Study the behavior of mathematical models
			CO4: formulate a linear programming problem and solve it by various methods
			CO5: give an optimal solution in assignment jobs, give transportation of items from sources to destinations
12	II-II	Engineering Geology (20A01401T)	CO1: Gain basic knowledge on characteristics of rocks and
			CO2: Gain basic knowledge on characteristics of minerals
			CO3: Identify and differentiate rocks using geological classification
			CO4: Carry out geo physical investigations for infrastructural projects
			CO5: Apply concepts of structural geology for civil engineering structures
13	II-II	STRUCTURAL ANALYSIS -I (20A01402)	CO1: Determine deflection at any point on a beam under simple and combined loads
			CO2: Apply energy theorems for analysis of indeterminate structures
			CO3: Analyze indeterminate structures with yielding of supports
			CO4: Analyze beams and portal frames using slope deflection and moment distribution methods
			CO5: Analyze bending moment, normal thrust and radial shear in the arches
14	II-II	Concrete Technology (20A01403T)	CO1: Understand various ingredients of concrete and their role.
			CO2: Examine knowledge on the fresh and hardened properties of concrete.
			CO3: Examine the behavior of concrete with response to stresses developed
			CO4: Design concrete mixes using various methods
			CO5: Perceive special concretes for accomplishing performance levels
15	II-II	Environmental Engineering - I (20A01404T)	CO1: Understand about quality of water and purification process
			CO2: Select appropriate technique for treatment of wastewater
			CO3: Assess the impact of air pollution
			CO4: Understand consequences of solid waste and its management
			CO5: Design domestic plumbing systems
16	II-II	ENGINEERING GEOLOGY LAB (20A01401P)	CO: At the end of the course the students will be able to classify various types of rocks, their properties and they will be familiar with interpretation of geological maps

17	II-II	Concrete Materials Lab (20A01405)	CO1: To find the characteristics of fine and coarse aggregates
			CO2: To understand the workability behavior of concrete through various tests
18	II-II	ENVIRONMENTAL ENGINEERING LAB	CO: At the end of the course, the student will be able to Understand about quality of water standards
19	II-II	Soft Skills (20A52401)	CO1: Memorize various elements of effective communicative skills
			CO2: Interpret people at the emotional level through emotional intelligence
			CO3: apply critical thinking skills in problem solving
			CO4: analyze the needs of an organization for team building
			CO5: Judge the situation and take necessary decisions as a leader . Develop social and work-life skills as well as personal and emotional well-being
20	II-II	Design Thinking for Innovation (20A99401)	CO1: Define the concepts related to design thinking.
			CO2: Explain the fundamentals of Design Thinking and innovation
			CO3: Apply the design thinking techniques for solving problems in various sectors
			CO4: Analyze to work in a multidisciplinary environment
			CO5: Evaluate the value of creativity. Formulate specific problem statements of real time issues
21	III-I	(19A01501) DESIGN OF REINFORCED CONCRETE STRUCTURES	CO1: Understand the basic concepts of working stress and limit state design methods
			CO2: Design various RC elements like beams, columns, footings and slabs.
			CO3: Design various RC elements like footings.
			CO4: Design various RC elements and slabs.
			CO5: Apply design concepts to complex structural systems in advanced courses

22	III-I	(19A01502) WATER RESOURCE ENGINEERING	CO1: Understand of the theories and principles governing the hydro logic processes.
			CO2: Identify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects
			CO3: Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures
			CO4: Determine aquifer parameters, yield of wells and model hydrologic processes
			CO5: Understand duty and delta. Understand soil, water, plant relationships. Design the Hydraulic structures.
23	III-I	(19A01503T) ENGINEERING GEOLOGY	CO1: Gain basic knowledge on characteristics of rocks and minerals.
			CO2: Identify and differentiate rocks using geological classification.
			CO3: Carry out geo physical investigations for infrastructural projects
			CO 4: Apply concepts of structural geology for civil engineering structures.
			CO 5: Understand the seismic zones of India
24	III-I	(19A01504) STRUCTURAL ANALYSIS-II	CO1: Analyze the final moments at the ends of the members
			CO2: Analyze bending moment, normal thrust and radial shear in the arches
			CO3: Analyze the variation of shear force and bending moment in the members due to rolling loads
			CO4: Analyze the degree of indeterminacy of the structures, reactions and displacement
			CO5: Analyze the formation of plastic hinges in different mechanisms
25	III-I	(19A01505c) ENVIRONMENTAL POLLUTION AND CONTROL PROFESSIONAL ELECTIVE-I	CO1: Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
			CO2: Identify the air pollutant control devices and have knowledge on the NAAQ standards and air emission standards.
			CO3: Differentiate the treatment techniques used for sewage and industrial wastewater treatment
			CO4: Inventing the methods of environmental sanitation and the management of community facilities without spread of epidemics

27	III-I	(19A01507) COMPUTER AIDED CIVIL ENGINEERING DRAWING	CO1: Develop drawing skills for effective demonstration of building details.
			CO2: Draw building plans using Computer Aided Design and Drafting software's
			CO3: Develop engineering project drawings incorporating details and design parameters in 2D & 3D.
			CO4: Examine efficacy of CAD design
28	III-I	(19A01508) ENVIRONMENTAL ENGINEERING LAB	CO1: Understand about quality of water and purification process
			CO2: Select appropriate technique for treatment of waste water
			CO3: Assess the impact of air pollution
			CO4: Understand consequences of solid waste and its management
29	III-I	(19A01503P) ENGINEERING GEOLOGY LAB	CO5: Design domestic plumbing systems
			CO: At the end of the course the students will be able to classify various types of rocks, their properties and they will be familiar with interpretation of geological maps.
30	III-I	(19A99501) MANDATORY COURSE: CONSTITUTION OF INDIA	CO1: Understand historical background of the constitution making and its importance for building a democratic India.
			CO2: Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
			CO3: Understand the value of the fundamental rights and duties for becoming good citizen of India
			CO4: Analyze the decentralization of power between central, state and local self-government
			CO5: Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
31	III-II	(19A01601T) GEOTECHNICAL ENGINEERING-I	CO1: Classify various types of soils using USCS and IS classification methods
			CO2: Understand the behavior of coarse grained and fine grained soils.
			CO3: Design earth dams using different methods
			CO4: Calculate the stress distribution in foundations
			CO5: Know the field Compaction control. Determination of settlement of foundations. Calculate the shear strength of soil under different drainage conditions
32	III-II	(19A01602) DESIGN OF STEEL STRUCTURES	CO1: explain relevant IS codes
			CO2: analysis and design of flexural members and detailing
			CO3: Design compression members of different types with connection detailing
			CO4: Design Plate Girder and Gantry Girder with connection

33	III-II	19A52601T ENGLISH LANGUAGE SKILLS	CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
			CO2: Apply grammatical structures to formulate sentences and correct word forms
			CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions
			CO4: Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
			CO5: Create a coherent paragraph interpreting a figure/graph/chart/table
34	III-II	(19A52604a) SOFT SKILLS (OPEN ELECTIVE-II)	CO1: Recognize the importance of verbal and non verbal skills
			CO2: Develop the interpersonal and intrapersonal skills
			CO3: Apply the knowledge in setting the SMART goals and achieve the set goals
			CO4: Analyze difficult situations and solve the problems in stress-free environment
			CO5: Create trust among people and develop employability skills
35	III-II	(19A52602b) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	CO1: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO2: Apply concepts of production , cost and revenues for effective business decisions
			CO3: Students can analyze how to invest their capital and maximize returns
			CO4: Evaluate the capital budgeting techniques
			CO5: Prepare the accounting statements and evaluate the financial performance of business entity
36	III-II	(19A01601P) GEOTECHNICAL ENGINEERING LAB	CO1: Identify various soils based on their characteristics.
			CO2: Evaluate permeability and seepage of soils
			CO3: Determine plasticity characteristics of various soils
			CO4: Design consolidation process by predicting settlement of soils
37	III-II	19A52601P ENGLISH LANGUAGE SKILLS LAB	CO1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
			CO2: Apply communication skills through various language learning activities
			CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
			CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings
			CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
			CO1: Understand basic concepts and its methodologies
			CO2: Demonstrate the knowledge of research processes

39	IV-I	15A01701 FINITE ELEMENT METHODS	CO1: Demonstrate the differential equilibrium equations and their relationship
			CO2: Apply numerical methods to FEM
			CO3: Demonstrate the displacement models and load vectors
			CO4: Compute the stiffness matrix for isoperimetric elements
			CO5: Compute the stiffness matrix for isoperimetric elements. Analyze plane stress and plane strain problems
40	IV-I	15A01702 TRANSPORTATION ENGINEERING – II	CO1: Able to understand the geometric design elements of RailwayTrack and their design methods
			CO2: Able to understand the design methods
			CO3: Understand the aircraft characteristics and their influence on various design elements
			CO4: Acquire the knowledge of types of Docks, Ports.
			CO5: Acquire the knowledge of types of Harbors
41	IV-I	15A01703 ENVIRONMENTAL ENGINEERING	CO1: Identify the source of water and water demand
			CO2: Apply the water treatment concept and methods
			CO3: Apply water distribution processes and operation and maintenance of water supply
			CO4: Prepare basic process designs of water and waste water treatment plants collect, reduce, analyze, and evaluate basic water quality data
			CO5: Determine the sewage characteristics and design various sewage treatment plants. Carry out municipal water and wastewater treatment system design and operation. Apply environmental treatment technologies and design processes
42	IV-I	15A01704 WATER RESOURCES ENGINEERING-II	CO1: Design various canal systems
			CO2: Design head and cross regulator structures
			CO3: Identify various types of reservoir and their design aspects
			CO4: By the Establishes the understanding of cross drainage works and its design
			CO5: Design different types of dams
43	IV-I	15A01706 GROUND IMPROVEMENT TECHNIQUES (CBCC - II)	CO1: Identification of Expansive soils
			CO2: Identify the problems in Expansive soils
			CO3: Implement the stabilization methods
			CO4: Apply grouting techniques
			CO5: Apply dewatering techniques
44	IV-I	15A01708 BRIDGE ENGINEERING (CBCC - III)	CO1: Design the basic components of bridge structures like bridge deck slabs,
			CO2: Design the basic components of bridge structures like longitudinal girders, transverse girders
			CO3: Design the basic components of bridge structures like piers and well foundations
			CO4: Understand the IRC classes of loading and railway bridge rules for detailed calculation of loadings and design of various components
			CO5: Understand the IRC classes of loading and railway bridge rules for detailed calculation of loadings and design of various components

45	IV-I	15A01711 CAD LABORATORY	CO1: Achieve skill sets to prepare computer aided engineering drawings
			CO2: Utilize the power and precision of AutoCAD as a drafting and design tool
			CO3: Apply basic CAD concepts to develop and construct accurate 2D geometry through creation of basic geometric constructions
			CO4: A student will know what is plan and how it should be drawn in auto CAD software
			CO5: Able to Convert 3D solid models into 2D drawing-different views, sections
46	IV-I	15A01712 ENVIRONMENTAL ENGINEERING LABORATORY	CO: At the end of the course, the student will be able to Understand about quality of water standards
47	IV-II	15A01802 ADVANCED STRUCTURAL ENGINEERING (MOOCS – II)	CO1: Design of roof systems with reference to Indian standards
			CO2: Design of water retaining structures
			CO3: Design of water storage structures
			CO4: Design of silos
			CO5: Design of chimneys
48	IV-II	15A01804 ENVIRONMENTAL IMPACT ASSESSMENT & MANAGEMENT (MOOCS – III)	CO1: Perform a critical quality review of an EIA and EIS
			CO2: Structure the EIA working process considering the need for interdisciplinary
			CO3: Perform the screening and scoping of an EIA, based on existing requirements, evaluate the impacts and draw meaningful conclusions from the results of the EIA;
			CO4: Clarify the concept of EIA and its application in an international context to those involved in or affected by the EIA process
			CO5: Interpretate an EIA, present its conclusions and translate its conclusions into actions

Electrical and Electronics Engineering I & II Sem Course Outcomes

SNO	YEAR / SEM	COURSE NAME	COURSE OUT COMES
1	II/I	Complex variables and Transforms	CO 1: Understand the analyticity of complex functions and conformal mappings.
			CO 2: Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
			CO 3: Understand the usage of Laplace transforms, Fourier transforms and z transforms
			CO 4: Evaluate the Fourier series expansion of periodic functions.
			CO 5: Understand the use of Fourier transforms and apply z transforms to solve difference equations.
2	II/I	ELECTRICAL CIRCUIT ANALYSIS	CO 1: Understand the analysis of three phase balanced and unbalanced circuits and to measure active and reactive powers in three phase circuits.
			CO 2: To get knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C excitation.
			CO 3: To get knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for A.C excitation.
			CO 4: Applications of Fourier transforms to electrical circuits excited by non-sinusoidal sources are known.
			CO 5: To design filters and equalizers.
3	II/I	DC MACHINES & TRANSFORMERS	CO 1: Understand the concepts of magnetic circuits, principle and operations of DC machines, starters and single and three phase transformers
			CO 2: Analyze armature reaction, parallel operation, speed control and characteristics of DC machines. Also analyze the performance characteristics with the help of OC and SC tests of transformer
			CO 3: Evaluate generated emf, back emf, speed, efficiency and regulations of DC machines and efficiency and regulation of transformer also load sharing of parallel connected transformers
			CO 4: Design winding diagrams of DC machines and equivalent circuit of transformer.
			CO 5: Evaluate efficiency and regulation of transformer also load sharing of parallel connected transformers
4	II/I	DIGITAL LOGIC DESIGN	CO 1: Understand the properties of Boolean algebra, other logic operations, and minimization of Boolean functions using Karnaugh map.
			CO 2: Make use of the concepts to solve the problems related to the logic circuits.
			CO 3: Analyze the combinational and sequential logic circuits.
			CO 4: Develop digital circuits using HDL, and Compare various Programmable logic devices
			CO 5: Design various logic circuits using Boolean algebra, combinational and sequential logic circuits.

5	II/I	Managerial Economics & Financial Analysis	CO 1: Define the concepts related to Managerial Economics, financial accounting and management
			CO 2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO 3: Apply the Concept of Production cost and revenues for effective Business decision
			CO 4: Analyze how to invest their capital and maximize returns
			CO 5: Develop the accounting statements and evaluate the financial performance of business entity.
6	II/I	ELECTRICAL CIRCUIT ANALYSIS LAB	CO 1: Understand and experimentally verify various resonance phenomenon.
			CO 2: Understand and analyze various current locus diagrams.
			CO 3: Apply and experimentally analyze two port network parameters
			CO 4: Apply and experimentally analyze of Z and Y parameters
			CO 5: Apply and experimentally analyze of ABCD and H parameters
7	II/I	DC MACHINES & TRANSFORMERS LAB	CO 1: Able to conduct and analyze load test on DC shunt generator
			CO 2: Able to understand and analyze magnetization characteristics of DC shunt generator
			CO 3: Able to understand and analyze speed control techniques and efficiency of DC machines
			CO 4: Able to understand to predetermine efficiency of single-phase Transformers
			CO 5: Able to understand to predetermine regulation of single-phase Transformers
8	II/I	DIGITAL LOGIC DESIGN LAB	CO 1: Understand the pin configuration of various digital ICs used in the lab
			CO 2: Conduct the experiment and verify the properties of various logic circuits.
			CO 3: Analyze the sequential and combinational circuits.
			CO 4: Design of any sequential/combinational circuit using Hardware/ HDL.
			CO 5: Analyze the sequential and combinational circuits.
9	II/I	Application Development with Python	CO 1: Identify the issues in software requirements specification and enable to write SRS documents for software development problems
			CO 2: Explore the use of Object oriented concepts to solve Real-life problems
			CO 3: Design database for any real-world problem
			CO 4: Solve mathematical problems using Python programming language
			CO 5: Design database for any real-world problem
10	II/I	UNIVERSAL HUMAN VALUES	CO 1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature)
			CO 2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
			CO 3: They would have better critical ability.
			CO 4: They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
			CO 5: Students are expected to become more aware of themselves, and their surroundings

11	II/II	Numerical Methods & Probability Theory	CO 1:Apply numerical methods to solve algebraic and transcendental equations
			CO 2:Derive interpolating polynomials using interpolation formulae
			CO 3: Solve differential and integral equations numerically
			CO 4:Apply Probability theory to find the chances of happening of events.
			CO 5: Understand various probability distributions and calculate their statistical constants.
12	II/II	ANALOG ELECTRONIC CIRCUITS	CO 1: List various types of feedback amplifiers, oscillators and large signal amplifiers
			CO 2:Explain the operation of various electronic circuits and linear lcs
			CO 3:Apply various types of electronic circuits to solve engineering problems
			CO 4:Analyze various electronic circuits and regulated power supplies for proper understanding
			CO 5:Justify choice of transistor configuration in a cascade amplifier.Design electronic circuits for a given specification
13	II/II	POWER ELECTRONICS	CO 1: Understand the operation, characteristics and usage of basic Power Semiconductor Devices.
			CO 2:Understand different types of Rectifier circuits with different operating conditions.
			CO 3:Understand DC-DC converters operation and analysis of their characteristics.
			CO 4:Understand the construction and operation of voltage source inverters, Voltage Controllers and Cyclo Converters.
			CO 5: Apply all the above concepts to solve various numerical problem solving
14	II/II	AC MACHINES	CO 1: Understand the basics of ac machine windings, construction, principle of working, equivalent circuit of induction and synchronous machines.
			CO 2: Analyze the phasor diagrams of induction and synchronous machine, parallel operation of alternators, synchronization and load division of synchronous generators.
			CO 3:Apply the concepts to determine V and inverted V curves and power circles of synchronous motor.
			CO 4:Analyze the various methods of starting in both induction and synchronous machines.
			CO 5:Understand the fundamentals of AC machines, know equivalent circuit performance characteristics.
15	II/II	ELECTROMAGNETIC FIELD THEORY	CO 1:Understand the concept of electrostatics
			CO 2:Understand the concepts of Conductors and Dielectrics
			CO 3: Understand the fundamental laws related to Magneto Statics
			CO 4:Understand the concepts of Magnetic Potential and Time varying Fields
			CO 5:understand the basic principles of magneto statics for time invariant and time varying fields
16	II/II	ANALOG ELECTRONIC CIRCUITS LAB	CO 1:Analyze various amplifier circuits.
			CO 2: Design multistage amplifiers.
			CO 3:Design OPAMP based analog circuits.
			CO 4: Understand working of logic gates.
			CO 5:Design and implement Combinational and Sequential logic circuits.

17	II/II	POWER ELECTRONICS LAB	CO 1: Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
			CO 2: Analyze the operation of single-phase half & fully-controlled converters and inverters with different types of loads.
			CO 3: Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cyclo converters with different loads.
			CO 4: Create and analyze various power electronic converters using PSPICE software.
			CO 5: Create and analyze various power electronic converters using PSPICE software.
18	II/II	AC MACHINES LAB	CO 1: Analyze and apply load test, no-load and blocked-rotor tests for construction of circle diagram and equivalent circuit determination in a single phase induction motor.
			CO 2: Predetermine regulation of a three-phase alternator by synchronous impedance & m.m.f methods.
			CO 3: Predetermine the regulation of Alternator by Zero Power Factor method X_d and X_q determination of salient pole synchronous machine.
			CO 4: Evaluate and analyze V and inverted V curves of 3 phase synchronous motor
			CO 5: Evaluate and analyze V and inverted V curves of 3 phase synchronous motor
19	II/II	CIRCUITS SIMULATION AND ANALYSIS USING PSPICE	CO 1: Simulation of various circuits using PSPICE software.
			CO 2: Simulation of single-phase half & fully-controlled converters, and inverters
			CO 3: Simulation of single-phase AC Voltage controllers with different loads.
			CO 4: Simulation of various circuits using PSPICE software.
			CO 5: Simulation of single-phase half & fully-controlled converters, and inverters
20	II/II	Design Thinking for Innovation	CO 1: Define the concepts related to design thinking
			CO 2: Explain the fundamentals of Design Thinking and innovation
			CO 3: Apply the design thinking techniques for solving problems in various sectors.
			CO 4: Analyse to work in a multidisciplinary environment
			CO 5: Evaluate the value of creativity
21	III/I	AC MACHINES	CO 1: Understand the basics of ac machine windings, construction, principle of working, equivalent circuit of induction and synchronous machines.
			CO 2: Analyze the phasor diagrams of induction and synchronous machine, parallel operation of alternators, synchronization and load division of synchronous generators.
			CO 3: Apply the concepts to determine V and inverted V curves and power circles of synchronous motor.
			CO 4: Analyze the various methods of starting in both induction and synchronous machines.
			CO 5: Analyze the various methods of starting in both induction and synchronous machines.

22	III/I	CONTROL SYSTEMS	CO 1: Understand the concepts of control systems classification, feedback effect, mathematical modelling, time response and frequency response characteristics, state space analysis
			CO 2: Apply the concepts of Block diagram reduction, Signal flow graph method and state space formulation for obtaining mathematical and Root locus, Bode, Nyquist, Polar plots for stability calculations, controllability and observability and demonstrate the use of these techniques.
			CO 3: Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
			CO 4: Design and develop different compensators, controllers and their performance evaluation for various conditions. Implement them in solving various engineering applications.
			CO 5: Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
23	III/I	English Language Skills	CO 1: Facilitate active listening to enable inferential learning through expert lectures and talks.
			CO 2: Impart critical reading strategies for comprehension of complex texts.
			CO 3: Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids.
			CO 4: Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence.
			CO 5: Encourage use of a wide range of grammatical structures and vocabulary in speech and writing.
24	III/I	ELECTRICAL MACHINE DESIGN	CO 1: Understand various design factors, types of windings, choice of machine, selection and ratings.
			CO 2: Able to design DC machine based on specified rating.
			CO 3: Able to design 1- ϕ transformer based on specified rating.
			CO 4: Able to design 3- ϕ Induction machine based on specified rating.
			CO 5: Able to design 3- ϕ Synchronous machine based on specified rating.

25	III/I	HVDC and FACTS	CO 1: The necessity of HVDC systems as emerging transmission networks.
			CO 2: Power Electronic devices to understand the necessity of reactive power compensation devices.
			CO 3: To obtain equivalent circuits of various HVDC system configurations.
			CO 4: To analyze the configurations of shunt, VAR, series configurations, etc.
			CO 5: To analyze the transmission control strategies.
26	III/I	ANALOG ELECTRONICS	CO 1: Understand the characteristics of various types of electronic devices and circuits.
			CO 2: Apply various principles of electronic devices and circuits to solve complex.
			CO 3: Engineering problems.
			CO 4: Analyse the functions of various types of electronic devices and circuits, Evaluate the functions of various types of electronic devices and circuits in real time applications.
			CO 5: Design various types of electronic circuits for use in real time applications.
27	III/I	AC MACHINES LAB	CO 1: Analyze and apply load test, no-load and blocked-rotor tests for construction of circle diagram and equivalent circuit determination in a single phase induction motor.
			CO 2: Predetermine regulation of a three-phase alternator by synchronous impedance & m.m.f methods.
			CO 3: Predetermine the regulation of Alternator by Zero Power Factor method Xd and Xq determination of salient pole synchronous machine.
			CO 4: Evaluate and analyze V and inverted V curves of 3 phase synchronous motor
			CO 5: Evaluate and analyze V and inverted V curves of 3 phase synchronous motor
28	III/I	English Language Skills Lab	CO 1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
			CO 2: Apply communication skills through various language learning activities
			CO 3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
			CO 4: Evaluate and exhibit acceptable etiquette essential in social and professional settings
			CO 5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

29	III/I	POWER ELECTRONICS AND SIMULATION LAB	CO 1: Understand and analyze various characteristics of power electronic devices with gate firing circuits and forced commutation techniques.
			CO 2: Analyze the operation of single-phase half & fully-controlled converters and inverters with different types of loads.
			CO 3: Analyze the operation of DC-DC converters, single-phase AC Voltage controllers, cyclo converters with different loads.
			CO 4: Create and analyze various power electronic converters using PSPIICE software.
			CO 5: Create and analyze various power electronic converters using PSPIICE software.
30	III/II	SIGNALS AND SYSTEMS	CO 1: Understand the mathematical description and representation of continuous-time and discrete-time signals and systems
			CO 2: understand the concepts of various transform techniques.
			CO 3: Apply sampling theorem to convert continuous-time signals to discrete-time signals
			CO 4: Analyze the frequency spectra of various continuous-time and discrete-time signals using different transform methods
			CO 5: Classify the systems based on their properties and determine the response of them
31	III/II	DIGITAL COMPUTE PLATFORMS	CO 1: Understand the basic architecture & pin diagram of 8086 microprocessor.
			CO 2: Assembly language programming to perform a given task, Interrupt service routines for all interrupt types
			CO 3: Microprocessor and Microcontroller designing for various applications
			CO 4: Write Assembly Language Programs for the Digital Signal Processors and use Interrupts for real-time control applications
			CO 5: Write Xilinx programming and understanding of Spartan FPGA board
32	III/II	POWER SYSTEM ANALYSIS	CO 1: Remember and understand the concepts of per unit values, Y Bus and Z bus formation, load flow studies, symmetrical and unsymmetrical fault calculations.
			CO 2: Apply the concepts of good algorithm for the given power system network and obtain the converged load flow solution
			CO 3: Analyse the symmetrical faults and unsymmetrical faults and done the fault calculations, analyse the stability of the system and improve the stability
			CO 4: Develop accurate algorithms for different networks and determine load flow studies and zero, positive and negative sequence impedances to find fault calculations
			CO 5: Design and select efficient Circuit Breakers to improve system stability. Implement them in resolving various day-to-day issues in a Power System.
33	III/II	POWER QUALITY	CO 1: Recognize the importance of verbal and non verbal skills
			CO 2: Develop the interpersonal and intrapersonal skills
			CO 3: Apply the knowledge in setting the SMART goals and achieve the set goals
			CO 4: Analyze difficult situations and solve the problems in stress-free environment
			CO 5: Create trust among people and develop employability skills
			CO 1: Recognize the importance of verbal and non verbal skills

35	III/II	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	CO 1: Define the concepts related to Managerial Economics, financial accounting and management
			CO 2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO 3: Apply the Concept of Production cost and revenues for effective Business decision
			CO 4: Analyze how to invest their capital and maximize returns
			CO 5: Develop the accounting statements and evaluate the financial performance of business entity.
36	III/II	CONTROL SYSTEMS & SIMULATION LAB	CO 1: Get the knowledge of feedback control and transfer function of DC servo motor.
			CO 2: Model the systems and able to design the controllers and compensators.
			CO 3: Get the knowledge about the effect of poles and zeros location on transient and steady state behaviour of second order systems and can implement them to practical systems and MATLAB
			CO 4: Determine the performance and time domain specifications of first and second order systems.
			CO 5: Determination of transfer functions of various systems and control of it by different methodologies.
37	III/II	DIGITAL COMPUTE PLATFORMS LAB	CO 1: Assembly language programming on 8086 Microprocessors.
			CO 2: Interfacing of various devices with 8086.
			CO 3: MASAM Programming.
			CO 4: Interfacing 8051 Microcontroller with its peripheral devices
			CO 5: Interfacing 8051 Microcontroller with its peripheral devices
38	IV/I	ELECTRICAL DISTRIBUTION SYSTEMS	CO 1: Compute the various factors associated with power distribution.
			CO 2: Make voltage drop calculations in given distribution networks.
			CO 3: Learn principles of substation maintenance.
			CO 4: Compute power factor improvement for a given system and load.
			CO 5: Understand implementation of SCADA for distribution automation.
39	IV/I	DIGITAL SIGNAL PROCESSING	CO 1: Formulate engineering problems in terms of DSP tasks.
			CO 2: Apply engineering problems solving strategies to DSP problems.
			CO 3: Design and test DSP algorithms.
			CO 4: Analyze digital and analog signals and systems.
			CO 5: Encode information into signals.
40	IV/I	POWER SYSTEM OPERATION	CO 1: Develop the mathematical models of turbines and governors.
			CO 2: Address the Load Frequency Control problem.
			CO 3: Explain how shunt and series compensation helps in reactive power control

42	IV/I	ENERGY AUDITING & DEMAND SIDE MANAGEMENT	CO 1:Conduct energy auditing and evaluate energy audit results.
			CO 2:Carry out motor energy audit.
			CO 3:Analyze demand side management concepts through case study.
			CO 4:Conduct energy auditing and evaluate energy audit results.
			CO 5:Analyze demand side management concepts through case study.
43	IV/I	FLEXIBLE AC TRANSMISSION SYSTEMS	CO 1: Understand various control issues, for the purpose of identifying the scope and for selection of specific FACTS controllers.
			CO 2:Apply the concepts in solving problems of simple power systems with FACTS controllers.
			CO 3:Design simple FACTS controllers and converters for better transmission of electric power.
			CO 4:Understand various control issues, for the purpose of identifying the scope and for selection of specific FACTS controllers.
			CO 5: Apply the concepts in solving problems of simple power systems with FACTS controllers.
44	IV/I	DIGITAL SIGNAL PROCESSING LABORATORY	CO 1: Able to design real time DSP systems and real world applications.
			CO 2: Able to implement DSP algorithms using both fixed and floating point processors.
			CO 3:Able to design real time DSP systems and real world applications.
			CO 4:Able to implement DSP algorithms using both fixed and floating point processors.
			CO 5:Able to design real time DSP systems and real world applications.
45	IV/I	POWER SYSTEMS AND SIMULATION LABORATORY	CO 1: Experimental determination (in machines lab) of sequence impedance and subtransient reactances of synchronous machine.
			CO 2: Conducting experiments to analyze LG, LL, LLG, LLLG faults.
			CO 3:The equivalent circuit of three winding transformer by conducting a suitable experiment.
			CO 4:Developing MATLAB program for formation of Y bus ,Z bus , g uss-aidel and fast decoupled load flow studies.
			CO 5:Developing the SIMULINK model for single area load frequency control problem.
46	IV/II	Instrumentation	CO 1:Identify and explain the types of errors occurring in measurement systems
			CO 2:Differentiate among the types of data transmission and modulation techniques
			CO 3:Apply digital techniques to measure voltage, frequency and speed
			CO 4: Choose suitable transducers for the measurement of non-electrical quantities
			CO 5:Apply digital techniques to measure voltage, frequency and speed
47	IV/II	HVDC TRANSMISSION	CO 1:Compare HVDC and HVAC transmission systems
			CO 2: Understand the operation of various converters used in HVDC transmission systems
			CO 3: Devise means to suppress / eliminate harmonics
			CO 4:Design HVDC and AC Filters
			CO 5:Understand the operation of AC Filters

Mechanical Engineering I & II Sem Course Outcomes

SNO	YEAR / SEM	COURSE NAME	COURSE OUT COMES
1	II/I	Complex variables, Transforms & Partial Differential Equations	CO 1: Understand the analyticity of complex functions and conformal mappings.
			CO 2: Apply cauchy's integral formula and cauchy's integral theorem to evaluate improper integrals along contours.
			CO 3: Understand the usage of laplace transforms.
			CO 4: Evaluate the fourier series expansion of periodic functions.
			CO 5: Formulate/solve/classify the solutions of partial differential equations and also find the solution of one-dimensional wave equation and heat equation.
2	II/I	Fluid Mechanics and Hydraulic Machines	CO 1: Familiarize basic terms used in fluid mechanics
			CO 2: Understand the principles of fluid statics, kinematics and dynamics
			CO 3: Understand flow characteristics and classify the flows and estimate various losses in flow through channel.
			CO 4: Analyze characteristics for uniform and non-uniform flows in open channels.
			CO 5: Design different types of turbines, centrifugal and multistage pumps.
3	II/I	Manufacturing Processes	CO 1: Demonstrate different metal casting processes and gating systems.
			CO 2: Evaluate the forces and power requirements in rolling process. Apply the principles of various forging operations.
			CO 3: Classify working of various welding processes.
			CO 4: Outline the manufacturing methods of plastics, ceramics and powder metallurgy.
			CO 5: Identify different unconventional processes and their applications.
4	II/I	Thermodynamics	CO 1: Understand the importance of thermodynamic properties related to conversion of heat energy into work.
			CO 2: Understand the importance of thermodynamic properties related to conversion of heat energy into work.
			CO 3: Apply the laws of thermodynamics to boilers, heat pumps, refrigerators, heat engines, compressors and nozzles.
			CO 4: Utilize steam properties to design steam based components.
			CO 5: Analyze thermodynamic relations and air standard cycles.
5	II/I	Mechanics of Materials	CO 1: Evaluate stresses and strains
			CO 2: To draw the SF and BM diagrams for various beams under different loading conditions
			CO 3: Determine the resistance and deformation in machine members subjected to torsional loads and springs.
			CO 4: Analyze and design thin, thick cylinders.
			CO 5: Analysis of stresses in curved bars.

6	II/I	FLUID MECHANICS AND HYDRAULIC MACHINES LAB	CO 1: Understand the basic properties of fluids and apply Newton's Law of Viscosity in solving practical problems.
			CO 2: Computation of friction loss in laminar and turbulent flows.
			CO 3: Understand the principles of kinematics with specific emphasis on application of continuity equation, stream function etc.
			CO 4: Apply the principles of Bernoulli's equation in measurement of discharge in pipes, and in other pipe flow problems
			CO 5: Understand the working principle of pumps and turbines
7	II/I	Manufacturing Processes Lab	CO 1: Acquire practical knowledge on Metal Casting processes
			CO 2: Acquire practical knowledge on Press Working processes
			CO 3: Acquire practical knowledge on Welding processes
			CO 4: Acquire practical knowledge on forming processes
			CO 5: Acquire practical knowledge on unconventional machining Processes
8	II/I	Mechanics of Materials Lab	CO 1: Analyze the tensile and compressive strength of a specimen for applying in a practical design based project work.
			CO 2: Determine the hardness, impact strength, fatigue strength to analyze the application of a specific material for a given design requirements for different loading conditions of structures or machines.
			CO 3: Understanding the bending in beams and to analyze the bending stresses which further build the foundation of using modern analysis software.
			CO 4: Evaluate the capacity of a material to withstand torsional stresses for a safe and sustainable design of machine elements.
			CO 5: Evaluate the capacity of a material to withstand torsional stresses for a safe and sustainable design of machine elements.
9	II/I	Application Development with Python	CO 1: Identify the issues in software requirements specification and enable to write SRS documents for software development problems
			CO 2: Explore the use of Object oriented concepts to solve Real-life problems
			CO 3: Design database for any real-world problem
			CO 4: Solve mathematical problems using Python programming language
			CO 5: Solve mathematical problems using Python programming language
10	II/I	ENVIRONMENTAL SCIENCE	CO 1: Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
			CO 2: Understand flow and bio-geo- chemical cycles and ecological pyramids.
			CO 3: Understand various causes of pollution and solid waste management and related preventive measures.
			CO 4: About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
			CO 5: Cases of population explosion, value education and welfare programmes.

11	II/II	Numerical Methods & Probability theory	CO 1: Apply numerical methods to solve algebraic and transcendental equations
			CO 2: Derive interpolating polynomials using interpolation formulae
			CO 3: Solve differential and integral equations numerically
			CO 4: Apply probability theory to find the chances of happening of events.
			CO 5: Understand various probability distributions and calculate their statistical constants.
12	II/II	Applied Thermodynamics	CO 1: After completing this course, the students can
			CO 2: Understand the working of IC engines with combustion process.
			CO 3: Select compressors for different applications.
			CO 4: Use T-s diagram in vapour power and gas power cycles.
			CO 5: Evaluate the relative performance of different steam turbines, Select appropriate refrigerant for different applications.
13	II/II	KINETICS OF MACHINERY	CO 1: Understand the basic principles of mechanisms in mechanical engineering
			CO 2: Utilize analytical, mathematical and graphical aspects of kinematics of Machines for effective design
			CO 3: Examine the velocity and acceleration diagram for a given mechanism, Construct the cam profile for a given motion
			CO 4: Assess various concepts of mechanisms like straight line motion mechanisms, Steering gear mechanisms and working principles of power elements (Gears, gear trains, Cams) and design related problems effectively
			CO 5: Construct the cam profile for a given motion

14	II/II	Managerial Economics & Financial Analysis	CO 1: Define the concepts related to Managerial Economics, financial accounting and management
			CO 2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO 3: Apply the Concept of Production cost and revenues for effective Business decision
			CO 4: Analyze how to invest their capital and maximize returns
			CO 5: Develop the accounting statements and evaluate the financial performance of business entity.
15	II/II	Manufacturing Technology	CO 1: Relate tool wear and tool life.
			CO 2: Choose cutting processes and variables, Explain work-holding requirements.
			CO 3: Calculate the machining parameters for different machining processes.
			CO 4: Identify methods to generate different types of surfaces.
			CO 5: Design jigs and fixtures.
16	II/II	Applied Thermodynamics Lab	CO 1: Explain different working cycles of engine
			CO 2: Describe various types of combustion chambers in IC engines
			CO 3: Illustrate the working of refrigeration and air conditioning systems
			CO 4: Evaluate heat balance sheet of IC engine.
			CO 5: To find heat losses in various engines
17	II/II	Manufacturing Technology Lab	CO 1: Implement the concept of machining with various machine tools
			CO 2: Get hands on experience on various machine tools and machining operations.
			CO 3: Familiarize the construction and working of various machine tools.
			CO 4: Teach selection of parameters for different machining processes.
			CO 5: Identify methods to generate different types of surfaces.
18	II/II	Computer Aided Machine Drawing	CO 1: Demonstrate the conventional representations of materials and machine components.
			CO 2: Model riveted, welded and key joints using CAD system.
			CO 3: Create solid models and sectional views of machine components.
			CO 4: Generate solid models of machine parts and assemble them.
			CO 5: Translate 3D assemblies into 2D drawings, Create manufacturing drawing with dimensional and geometric tolerances.
19	II/II	Design Thinking for Innovation	CO 1: Define the concepts related to design thinking
			CO 2: Explain the fundamentals of Design Thinking and innovation
			CO 3: Apply the design thinking techniques for solving problems in various sectors.
			CO 4: Analyse to work in a multidisciplinary environment
			CO 5: Evaluate the value of creativity, Formulate specific problem statements of real time issues

20	III/I	APPLIED THERMODYNAMICS	CO 1: Explain working of IC engines with combustion process.
			CO 2: Select compressors for different applications.
			CO 3: Use T-s diagram in vapour power and gas power cycles.
			CO 4: Explain the basic principles of steam turbines.
			CO 5: Select appropriate refrigerant for different applications.
21	III/I	MANUFACTURING TECHNOLOGY	CO 1: Choose cutting processes and variables.
			CO 2: Relate tool wear and tool life.
			CO 3: Calculate the machining parameters for different machining processes.
			CO 4: Identify methods to generate different types of surfaces.
			CO 5: Explain work-holding requirements, Design jigs and fixtures.
22	III/I	HEAT TRANSFER	CO 1: Apply the concepts of different modes of heat transfer.
			CO 2: Apply knowledge of conduction heat transfer in the design of insulation of furnaces and pipes.
			CO 3: Analyse free and forced convection phenomena in external and internal flows.
			CO 4: Design of thermal shields using the concepts of black body and non-black body radiation.
			CO 5: Apply the basics of mass transfer for applications in diffusion of gases.

23	III/I	DYNAMICS OF MACHINERY	CO 1: Understand the effect of reactive gyroscopic couple on the stability of vehicles
			CO 2: Understand the power lost and power transmitted due to friction
			CO 3: Identify and correct the unbalances of rotating body
			CO 4: Reduce the magnitude of vibration and isolate vibration of dynamic systems
			CO 5: Determine dimensions of Governors for speed control.
24	III/I	POWER PLANT ENGINEERING	CO 1: Outline sources of energy, power plant economics, and environmental aspects
			CO 2: Explain power plant economics and environmental considerations
			CO 3: Describe working components of a steam power plant
			CO 4: Illustrate the working mechanism of diesel and gas turbine power plants
			CO 5: Summarize types of renewable energy sources and their working principle. Demonstrate the working principle of nuclear power plants.
25	III/I	TECHNICAL COMMUNICATION AND PRESENTATION SKILLS	CO 1: Understand the importance of effective technical communication
			CO 2: Apply the knowledge of basic skills to become good orators
			CO 3: Analyze non-verbal language suitable to different situations in professional life
			CO 4: Evaluate different kinds of methods used for effective presentations
			CO 5: Create trust among people and develop employability skills
26	III/I	Applied Thermodynamics Lab	CO 1: Explain different working cycles of engine
			CO 2: Describe various types of combustion chambers in ic engines
			CO 3: Illustrate the working of refrigeration and air conditioning systems
			CO 4: Evaluate heat balance sheet of ic engine.
			CO 5: To find heat losses in various engines
27	III/I	MANUFACTURING TECHNOLOGY LAB	CO 1: Explain the concept of machining with various machine tools.
			CO 2: Get hands on experience on various machine tools and machining operations.
			CO 3: The student will be able to develop simplified manufacturing processes with the aim of reduction of cost and manpower.
			CO 4: The student will be able to identify/control the appropriate process parameters, and possible defects of manufacturing processes so as to remove them.
			CO 5: The student will be able to make use of the softwares and CAD/Cam tools meant for optimizing manufacturing processes.
28	III/I	FLUID MECHANICS AND HYDRAULIC MACHINERY LAB	CO 1: Understand the basic properties of fluids and apply Newton's Law of Viscosity in solving practical problems.
			CO 2: Computation of friction loss in laminar and turbulent flows.
			CO 3: Understand the principles of kinematics with specific emphasis on application of continuity equation, stream function etc.
			CO 4: Apply the principles of Bernoulli's equation in measurement of discharge in pipes, and in other pipe flow problems

29	III/I	MANDATORY COURSE: CONSTITUTION OF INDIA	CO 1: Understand historical background of the constitution making and its importance for building a democratic India.
			CO 2: Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
			CO 3: Understand the value of the fundamental rights and duties for becoming good citizen of India.
			CO 4: Analyze the decentralization of power between central, state and local self-government
			CO 5: Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
30	III/II	DESIGN OF MACHINE ELEMENTS	CO 1: Estimate safety factors of machine members subjected to static and dynamic loads.
			CO 2: Design fasteners subjected to variety of loads.
			CO 3: Select of standard machine elements such as keys, shafts, couplings, springs and bearings.
			CO 4: Design clutches, brakes and spur gears.
			CO 5: Instruct different types of bearings and design procedures.
31	III/II	INTRODUCTION TO CAD/CAM	CO 1: Apply the basics of geometric representation and transformations in CAD/CAM.
			CO 2: Choose geometric modeling methods for building CAD models.
			CO 3: Compare NC, CNC and DNC.
			CO 4: Develop manual and computer aided part programming for turning and milling operations.
			CO 5: Summarize the principles of robotics AR,VR and AI in CIM.
32	III/II	ENGLISH LANGUAGE SKILLS	CO 1: Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
			CO 2: Apply grammatical structures to formulate sentences and correct word forms
			CO 3: Analyze discourse markers to speak clearly on a specific topic in informal discussions
			CO 4: Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
			CO 5: Create a coherent paragraph interpreting a figure/graph/chart/table

33	III/II	REFRIGERATION AND AIR CONDITIONING	CO 1: Summarize the various refrigeration and air conditioning equipments and it's working.
			CO 2: Apply the basic knowledge to operate the refrigeration systems.
			CO 3: Evaluate the cop for vapour absorption system.
			CO 4: Select the air conditioning systems for different realistic situations.
			CO 5: Appraise the importance of humidifiers and dehumidifiers.
34	III/II	Soft Skills	CO 1: Recognize the importance of verbal and non verbal skills
			CO 2: Develop the interpersonal and intrapersonal skills
			CO 3: Apply the knowledge in setting the SMART goals and achieve the set goals
			CO 4: Analyze difficult situations and solve the problems in stress-free environment
			CO 5: Create trust among people and develop employability skills
35	III/II	Managerial Economics And Financial Analysis	CO 1: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO 2: Apply concepts of production , cost and revenues for effective business decisions
			CO 3: Students can analyze how to invest their capital and maximize returns
			CO 4: Evaluate the capital budgeting techniques
			CO 5: Prepare the accounting statements and evaluate the financial performance of business entity.
36	III/II	HEAT TRANSFER LAB	CO 1: Explain different modes of heat transfer
			CO 2: Identify parameters for measurement for calculating heat transfer
			CO 3: Determine effectiveness of heat exchanger
			CO 4: Design new equipment related to heat transfer
			CO 5: Apply principles of heat transfer in wide application in industries.
37	III/II	ENGLISH LANGUAGE SKILLS LAB	CO 1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
			CO 2: Apply communication skills through various language learning activities
			CO 3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
			CO 4: Evaluate and exhibit acceptable etiquette essential in social and professional settings
			CO 5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
38	III/II	Mandatory Course: Research Methodology	CO 1: Understand basic concepts and its methodologies
			CO 2: Demonstrate the knowledge of research processes
			CO 3: Read, comprehend and explain research articles in their academic discipline
			CO 4: Analyze various types of testing tools used in research
			CO 5: Design a research paper without any ethical issues

39	IV/I	MANAGEMENT SCIENCE	CO 1: Defines the basic concepts in the field of management
			CO 2: Discusses organizational theories and models which are the important infrastructures of the management field.
			CO 3: Explains postmodern current concepts and approaches.
			CO 4: This helps to take effective and efficient management decisions on physical and human resources of an organization
			CO 5: Beside the knowledge of Management Science facilitates for his/her personal and professional development.
40	IV/I	AUTOMOBILE ENGINEERING	CO 1: Identify the different parts of the automobile
			CO 2: Explain the working of various parts like engine, transmission, clutch, brakes
			CO 3: Describe how the steering and the suspension systems operate
			CO 4: Understand the environmental implications of automobile emissions
			CO 5: Develop a strong base for understanding future developments in the automobile industry
41	IV/I	CAD/CAM	CO 1: input and output components of CAD, Steps involved in computer aided design.
			CO 2: The techniques of raster technology, scan conversion, clipping, removal of hidden lines and hidden surfaces, color, shading and texture.
			CO 3: Geometric Modelling constitutes the most important and complex part in most of CDA software packages
			CO 4: The flexibility of manufacturing achieved with the use of CNC and associated Technology
			CO 5: Understanding the definition and concept of FMS, and its elements etc.
42	IV/I	METROLOGY AND MEASUREMENTS	CO 1: Explain the basics knowledge of measurements, metrology and measuring devices.
			CO 2: Understand the principle of linear and angular measuring instruments and apply the acquired knowledge for the accurate and precise measurement of a given quantity.
			CO 3: Understand the fundamentals of various methods for the measurements of screw threads, surface roughness parameters and working of optical measuring instruments.
			CO 4: Understand various advanced measuring devices and machine tool metrology and to describe application of principle of metrology and measurements in industries.
			CO 5: Understand and able to use various devices for measuring torque, force, strain, stress and temperature. To develop competence in sensors, transducers and terminating devices with associated parameters.
43	IV/I	REFRIGERATION AND AIR CONDITIONING	CO 1: Analyze the reversed Carnot cycle and vapour compression refrigeration cycle (VCR).
			CO 2: Select the air-refrigeration systems for aircraft, and vapour absorption refrigeration system for rural and remote areas and select environmental friendly refrigerants considering the international standards.
			CO 3: Identify the Psychrometric processes for different applications and design the parameters of air-conditioning system as per standards.
			CO 4: Understand the human comfort, ASHRAE chart and concept of effective temperature.
			CO 5: Estimate cooling load and heating load considering human comfort and optimize the air conditioning system as per requirements.

44	IV/I	AUTOMATION AND ROBOTICS	CO 1: This unit students are able to understand to know what is automation, types of automation, components of automation, strategies and levels of automation.
			CO 2: The able to understand the types of flow lines, quantitative analysis of flow lines, how the assembly is carried out on automated flow line without interruption and how to balance the line and flexible assembly lines.
			CO 3: The various components in the anatomy of robot. By knowing this the student may apply in the design of new robotic structure
			CO 4: Student should also learn about the homogeneous transformations and its applications in the analysis of a robotic structure and method of developing different types of mechanisms and kinematics of the robot.
			CO 5: The control motion mechanism in all devices of robot and application of robots in manufacturing sector
45	IV/I	CAD/CAM LABORATORY	CO 1: Creation of part drawings and 3D models using CAD techniques.
			CO 2: Generation of part programs for industrial components using CAM techniques.
			CO 3: Skills to program and operate CNC machines
			CO 4: Ability to develop a product from conceptualization to reality.
			CO 5: Use CAM software to generate NC code
46	IV/I	METROLOGY & MEASUREMENTS LABORATORY	CO 1: Demonstrate and use different length measuring instruments like vernier calipers and micrometers
			CO 2: Explain different angle measuring instrument like universal bevel protractor, sine bar
			CO 3: Formulate some unknown quantity or parameter of engineering interest.
			CO 4: Evaluate the surface quality of a given specimen which is important in all kind of manufacturing.
			CO 5: Determine error and analysing uncertainty in the measurements. \Work in quality control and quality assurances divisions in industries.
47	IV/II	INDUSTRIAL ENGINEERING	CO 1: Identify the factors of production and output-cost relationship.
			CO 2: Apply break-even analysis to study the volume-profit relationship
			CO 3: Select the suitable pricing methods for various objectives
			CO 4: Describe the time value of money for different cash flow models.
			CO 5: Evaluate the market structure for profit maximization criteria.
48	IV/II	POWER PLANT ENGINEERING	CO 1: Describe and analyze different types of sources and mathematical expressions related to thermodynamics and various terms and factors involved with power plant operation.
			CO 2: Analyze the working and layout of steam power plants and the different systems comprising the plant and discuss about its economic and safety impacts
			CO 3: Combine concepts of previously learnt courses to define the working principle of diesel power plant, its layout, safety principles and compare it with plants of other types.
			CO 4: Describe the working principle and basic components of the nuclear power plant and the economic and safety principles involved with it.\
			CO 5: Discuss the working principle and basic components of the hydro electric plants and the economic principles

ELECTRONICS AND COMMUNICATION ENGINEERINGECE I & II SEM COURSE OUTCOMES

S.NO.	YEAR/SEM	Course Name	Course Outcome
1	II/I	Complex variables and Transforms	CO1: Understand the analyticity of complex functions and conformal mappings.
			CO2: Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
			CO3: Understand the usage of Laplace transforms, Fourier transforms and z transforms.
			CO4: Evaluate the fourier series expansion of periodic functions .
			CO5: Understand the use of fourier transforms and apply z transforms to solve difference equations .
2	II/I	SIGNALS AND SYSTEMS	CO1: Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques .
			CO2: Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems .
			CO3: Analyze the frequency spectra of various continuous-time and discrete-time signals using different transform methods ..
			CO4: Classify the systems based on their properties and determine the response of them ..
			CO5: understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems .
3	II/I	ELECTRICAL ENGINEERING	CO1: Able to acquire knowledge about how to determine the transient response of R-L, R-C, R-L-C series circuits for D.C and A.C excitations.
			CO2: Able to solve the problems on R L C circuits for different excitations using different approaches .
			CO3: Analyze the complex circuits of R L C circuits .
			CO4: Able to solve the problems the e.m.f. generated on DC Generator.
			CO5: Able to acquire knowledge about how to determine the efficiency and regulation of single phase transformer and synchronous machine.
4	II/I	ANALOG CIRCUITS	CO1: Understand the characteristics of differential amplifiers, feedback and power amplifiers.
			CO2: Examine the frequency response of multistage and differential amplifier circuits using BJT & MOSFETs at low and high frequencies.
			CO3: Investigate different feedback and power amplifier circuits based on the application.
			CO4: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillator circuits.
			CO5: Evaluate the performance of different tuned amplifiers and multivibrators, Design analog circuits for the given specifications and application .
			CO1: Define the concepts related to Managerial Economics, financial accounting and management ..
			CO2: Understand the fundamentals of Economics viz.. Demand, Production, cost, revenue and markets

6	II/I	SIMULATION LAB	CO1: Learn how to use the MATLAB software and know syntax of MATLAB programming . CO2: Understand how to simulate different types of signals and system response . CO3: Find the Fourier Transform of a given signal and plot amplitude and phase characteristics . CO4: Analyze the response of different systems when they are excited by different signals and plot power spectral density of signals. CO5: Generate/Simulate different random signals for the given specifications .
7	II/I	ELECTRICAL ENGINEERING LAB	CO1: Understand and experimentally verify various resonance circuits . CO2: Apply and experimentally analyze two port network parameters.. CO3: To determine the various parameters experimentally... CO4: To understand various characteristics of DC generators and DC motors . CO5: To predetermine the efficiency and regulation of a 1- ϕ transformer .
8	II/I	ANALOG CIRCUITS LAB	CO1: Know about the usage of equipment/components/software tools used to conduct the experiments in analog circuits . CO2: Conduct the experiment based on the knowledge acquired in the theory about various analog circuits using BJT/MOSFETs to find the important parameters of the circuit (viz. Voltage gain, Current gain, bandwidth, input and output impedances etc) experimentally. CO3: Analyze the given analog circuit to find required important CO4: Draw the relevant graphs between important metrics of the system, from the observed measurements Compare the experimental results with that of theoretical ones and infer the conclusions. CO5: Design the circuit for the given specifications.
9	II/I	Application Development with Python	CO1: To learn the basic concepts of software engineering and life cycle models . CO2: Identify the issues in software requirements specification and enable to write SRS documents for software development problems. CO3: Explore the use of Object oriented concepts to solve Real- life problems. CO4: Design database for any real-world problem . CO5: Solve mathematical problems using Python programming language .
10	II/I	UNIVERSAL HUMAN VALUES	CO1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature) . CO2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind . CO3: They would have better critical ability . CO4: They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society). CO5: It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction .
11	II/II	PROBABILITY THEORY AND STOCHASTIC PROCESS	CO1: To understand the principles of random signals and random processes. CO2: Understanding the concepts of Probability, Random Variables, Random Processes and their characteristics learn how to deal with multiple random variables, conditional probability, joint distribution and statistical independence.

12	II/II	DIGITAL LOGIC DESIGN	CO1: Understand the properties of Boolean algebra, other logic operations, and minimization of Boolean functions using Karnaugh map .
			CO2: Make use of the concepts to solve the problems related to the logic circuits .
			CO3: Analyze the combinational and sequential logic circuits .
			CO4: Develop digital circuits using HDL, and Compare various Programmable logic devices .
			CO5:Design various logic circuits using Boolean algebra, combinational and sequential logic circuits.
13	II/II	ELECTROMAGNETIC WAVES AND TRANSMISSION LINES	CO1: Explain basic laws of electromagnetic fields and know the wave concept.
			CO2: Solve problems related to electromagnetic fields
			CO3: Analyze electric and magnetic fields at the interface of different media .
			CO4: Derive Maxwell's equations for static and time varying fields ,Analogy between electric and magnetic field: .
			CO5: Describes the transmission lines with equivalent circuit and explain their characteristic with various lengths: .
14	II/II	COMMUNICATION SYSTEMS	CO1: Recognize/List the basic terminology used in analog and digital communication techniques for transmission of information/data .
			CO2: Explain/Discuss the basic operation of different analog and digital communication systems at baseband and pass band level .
			CO3: Compute various parameters of baseband and pass band transmission schemes by applying basic engineering knowledge .
			CO4: Analyze/Investigate the performance of different modulation & demodulation techniques to solve complex problems in the presence of noise.
			CO5: Evaluate/Assess the performance of all analog and digital modulation techniques to know the merits and demerits of each one of them in terms of bandwidth and power efficiency.
15	II/II	LINEAR AND DIGITAL IC APPLICATIONS	CO1: List out the characteristics of Linear and Digital ICs .
			CO2: Discuss the various applications of linear & Digital ICs .
			CO3: Solve the application based problems related to linear and digital ICs .
			CO4: Analyze various applications based circuits of linear and digital ICs .
			CO5: Design the circuits using either linear ICs or Digital ICs from the given specifications .
16	II/II	DIGITAL LOGIC DESIGN LAB	CO1: To conduct the experiments and verify the truth tables of various logic circuits ..
			CO2: Understand the pin configuration of various digital ICs used in the lab .
			CO3: Conduct the experiment and verify the properties of various logic circuits .
			CO4: Analyze the sequential and combinational circuits .
			CO5: Design of any sequential/combinational circuit using Hardware/ HDL .
17	II/II	Communication Systems Lab	CO1: Know about the usage of equipment/components/software tools used to conduct the experiments in analog and digital modulation techniques.
			CO2: Conduct the experiment based on the knowledge acquired in the theory about modulation and demodulation schemes to find the important metrics of the communication system experimentally.
			CO3: Analyze the performance of a given modulation scheme to find the important metrics of the system

18	II/II	LINEAR AND DIGITAL IC APPLICATIONS LAB	CO1: Understand the pin configuration of each linear/ digital IC and its functional diagram.
			CO2: Conduct the experiment and obtain the expected results.
			CO3: Analyze the given circuit/designed circuit and verify the practical observations with the analyzed results .
			CO4:Design the circuits for the given specifications using linear and digital ICs .
			CO5: Acquaintance with lab equipment about the operation and its use .
19	II/II	SOFT SKILLS	CO1: Memorize various elements of effective communicative skills ,Interpret people at the emotional level through emotional intelligence .
			CO2: apply critical thinking skills in problem solving .
			CO3: analyse the needs of an organization for team building .
			CO4:Judge the situation and take necessary decisions as a leader.
			CO5:Develop social and work-life skills as well as personal and emotional well-being .
20	II/II	Design Thinking for Innovation	CO1: Define the concepts related to design thinking the fundamentals of Design Thinking and innovation .
			CO2: Apply the design thinking techniques for solving problems in various sectors .
			CO3: Analyse to work in a multidisciplinary environment.
			CO4:Evaluate the value of creativity .
			CO5:Formulate specific problem statements of real time issues .
21	III/I	INTEGRATED CIRCUITS AND APPLICATIONS	CO1: Understand DC and AC characteristics of operational amplifiers & Op amp parameters and functionality of specialized ICs such as 555 TIMER, VCO, PLL & Voltage regulators .
			CO2: Make use of Op-Amps and specialized ICs to design circuits for various applications .
			CO3: Analyze Op-Amp based Comparators, Waveform generators, Active filters, Converters .
			CO4: Design of Op amp based Comparators, Waveform Generators, Active filters, Converters, design various multi-vibrator circuits using IC 555 timer .
			CO5:Compare different types of A/D and D/A Converter circuits .
22	III/I	ANTENNAS AND WAVE PROPAGATION	CO1: Understand various antenna parameters, principle of operation of various antennas viz. wired, aperture, micro strip antennas .
			CO2: Discuss various EM wave propagation methods in ionosphere and troposphere .
			CO3: Analyze mathematical aspects of wave propagation, Derive expressions related to radiation mechanisms for antennas
			CO4: Design various antennas namely array, micro strip, horn, lens and aperture antennas, etc., for a given application .
			CO5: Compare performance of various antennas .
23	III/I	ENGLISH LANGUAGE SKILLS	CO1: Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English .
			CO2: Apply grammatical structures to formulate sentences and correct word forms .
			CO3: Analyze discourse markers to speak clearly on a specific topic in informal discussions .
			CO4: Evaluate reading/listening texts and to write summaries based on global comprehension of these texts .
			CO5: Create a coherent paragraph interpreting a figure/graph/chart/table .

24	III/I	DIGITAL COMMUNICATIONS	CO1: Understand the elements of digital communication system, baseband pulse transmission, pass band digital modulation, geometric representation of signals, basics of information theory and error correcting codes .
			CO2: Apply the knowledge of signals and system & statistical theory to evaluate the performance of digital communication systems .
			CO3: Analyze the different coding, modulation techniques, Probability of error performance of digital system.
			CO4: Compare the performance of different modulation schemes& error correcting codes .
			CO5: Compare the power bandwidth, bit error probability for various modulation scheme.
25	III/I	DATA COMMUNICATIONS AND NETWORKS	CO1: Understand the requirement of theoretical & practical aspects of computer networks, functions of various layers involved in data communications, building the skills of sub netting and routing mechanisms .
			CO2: Explain the role of protocols in networking .
			CO3: Distinguish between the connection oriented and connection less transport protocols.
			CO4: Solve the error control and multiple access based problems .
			CO5: Analyze the services and features of the various layers in the protocol stack .
26	III/I	TECHNICAL COMMUNICATION AND PRESENTATION SKILLS	CO1: Understand the importance of effective technical communication .
			CO2: Apply the knowledge of basic skills to become good orators.
			CO3: Analyze non-verbal language suitable to different situations in professional life .
			CO4: Evaluate different kinds of methods used for effective presentations .
			CO5: Create trust among people and develop employability skills .
27	III/I	INTEGRATED CIRCUITS AND APPLICATIONS LAB	CO1: Understand the working of Op amp ICs & Application specific analog ICs .
			CO2: Analyze operational amplifier based circuits for linear and non-linear applications .
			CO3: Design Operational amplifiers for linear and nonlinear application, [Multivibrator circuits using 555 & application specific ICs
			CO4: Simulate all linear and nonlinear application based Op amp Circuits and circuits based on application specific ICs .
			CO5: Compare theoretical, practical & simulated results in integrated circuits .
28	III/I	ENGLISH LANGUAGE SKILLS LAB	CO1: Remember and understand the different aspects of the English language proficiency with emphasis on LSR W skills .
			CO2: Apply communication skills through various language learning activities .
			CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension .
			CO4: Evaluate and exhibit acceptable etiquette essential in social and professional settings .
			CO5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

29	III/I	DIGITAL COMMUNICATIONS LAB	CO1: To learn how to use MATLAB software and hardware effectively and creatively to synthesize digital communication systems.
			CO2: Understand real time behavior of different digital modulation schemes and technically visualize spectra of different
			CO3: Design and implement different modulation and demodulation techniques.
			CO4: Analyze digital modulation & demodulation techniques.
			CO5: Simulate all digital modulation and demodulation techniques in MATLAB.
30	III/I	MANDATORY COURSE: RESEARCH METHODOLOGY	CO1: Understand basic concepts and its methodologies.
			CO2: Demonstrate the knowledge of research processes.
			CO3: Read, comprehend and explain research articles in their academic discipline.
			CO4: Analyze various types of testing tools used in research.
			CO5: Formulate specific problem statements of real time issues.
31	III/II	MICROPROCESSORS AND MICROCONTROLLERS	CO1: To introduce fundamental architectural concepts of microprocessors and microcontrollers.
			CO2: Understand instruction set of 8086 microprocessor and ARM architecture.
			CO3: Explain addressing modes of 8086, develop assembly language programs for various problems, describe interfacing of 8086 with peripheral devices, architecture and addressing modes of ARM Cortex M0+, assembly instruction set of ARM Cortex
			CO4: Distinguish between microprocessor and microcontroller, 8025 & 8086 microprocessors, design applications using microcontrollers.
			CO5: Develop assembly language programs for various problems.
32	III/II	DIGITAL SIGNAL PROCESSING	CO1: To study the designs and structures of digital (IIR and FIR) filters from analysis to synthesis for a given specifications.
			CO2: Understand the basic concepts of IIR and FIR filters, DSP building blocks to achieve high speed in DSP processor, DSP TMS320C54XX architecture and instructions.
			CO3: Compute the fast Fourier transforms and find the relationship with other transforms. Realization of digital filter structures.
			CO4: Design of FIR and IIR digital filters.
			CO5: Compare FIR and IIR filters.
33	III/II	DIGITAL SYSTEM DESIGN THROUGH VHDL	CO1: Understand the architecture of FPGAs, tools used in modelling of digital design and modelling styles in VHDL.
			CO2: Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
			CO3: Analyze and design basic digital circuits with combinatorial and sequential logic circuits using VHDL.
			CO4: Model complex digital systems at several levels of abstractions, behavioural, structural.
			CO5: Design complex digital CPU, vending machine and washing machines etc and analyze the case studies.

34	III/II	PRINCIPLES AND TECHNIQUES OF MODERN RADAR SYSTEMS	CO1: To understand the basic principles of RADAR and its variants, RADAR based Microwave imaging .
			CO2: Apply the fundamental knowledge of various RADARs, Matched Filter and to find the range between the target and RADAR, frequency and phase of the received signal.
			CO3: Analyze the received data from the target using CW RADAR & MTI RADAR and to find the distance, tracking range for clutter analysis .
			CO4: To apply the radar fundamentals.
			CO5: Develop the MTI RADAR and to find the distance, tracking range for clutter analysis .
35	III/II	DATA SCIENCE	CO1: Demonstrate feature selection and dimensionality reduction.
			CO2: Solve decision making problems using k-NN, Naïve Bayes, SVM and Decision Trees.
			CO3: Visualize the data using bar charts, line charts and scatter plots .
			CO4: Analyse Correlation between two data objects .
			CO5: Design basic SQL Operations using NotQuiteABase .
36	III/II	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS	CO1: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets .
			CO2: Apply concepts of production , cost and revenues for effective business decisions .
			CO3: Students can analyze how to invest their capital and
			CO4: Evaluate the capital budgeting techniques .
			CO5: Prepare the accounting statements and evaluate the financial performance of business entity.
37	III/II	DIGITAL SIGNAL PROCESSING LAB	CO1: Ability to design-test, to verify, to evaluate, and to benchmark a real-time DSP system .
			CO2: Ability to calculate discrete time domain and frequency domain of signals using discrete Fourier series and Fourier transform.
			CO3: Ability to design, using MATLAB-based filter design techniques, FIR and IIR digital filters and Determine the frequency response of filters.
			CO4: Implementation of basic signal processing algorithms such as convolution, difference equation implementation and application of them in the construction of FIR and IIR filters.
			CO5: Design DSP based real time processing systems to meet desired needs of the society.
38	III/II	MICROPROCESSORS AND MICROCONTROLLERS LAB	CO1: Write ALP for arithmetic and logical operations in 8086.
			CO2: Familiarize with MASM, Embedded C & Code composer studio.
			CO3: Students can analyze, Write and execute programs in 8086, 8051 and ARM Cortex M0.
			CO4: Execution of different programs for 8086, 8051 in Assembly Level Language using MASM Assembler ...
			CO5: Design and implement some specific real time applications.
39	IV/I	OPTICAL FIBER COMMUNICATION	CO1: The course gives an account of optical Communication starting with the basic of fiber optics.
			CO2: Analyze the performance of both digital and analog optical fiber systems.
			CO3: Calculate the system bandwidth, noise, probability of error and maximum usable bit rate of a digital fiber system .
			CO4: Calculate the system link loss, distortion and dynamic range of an RF photonic link.
			CO5: To perform characteristics of fiber sources and detectors, design as well as conduct experiment in software and hardware, and analyze the results to provide valid conclusions.

40	IV/I	EMBEDDED SYSTEMS	CO1: To understand the fundamental concepts of Embedded systems.
			CO2: Design of embedded systems leading to 32-bit application development.
			CO3: Understand hardware-interfacing concepts to connect digital as well as analog sensors while ensuring low power considerations.
			CO4: Review and implement the protocols used by microcontroller to communicate with external sensors and actuators in real world
			CO5: Understand Embedded Networking and IoT concepts based upon connected MCUs.
41	IV/I	MICROWAVE ENGINEERING	CO1: To introduce the student the microwave test bench for measure different parameters like attenuation, VS\VR, etc.
			CO2: To understand the scattering matrix parameters and its use.
			CO3: Ability to analyze micro-wave circuits incorporating hollow, dielectric and planar waveguides, transmission lines, filters and other passive components, active devices..
			CO4: Ability to Use S-parameter terminology to describe circuits and to explain how microwave devices and circuits are characterized in terms of their "S"-Parameters.
			CO5: Ability to understanding of microwave transmission lines and how to Use microwave components such as isolators, Couplers, Circulators, Tees, Gytrators etc.
42	IV/I	DATA COMMUNICATIONS & NETWORKING	CO1: Introduce to Networks & Data Communications.
			CO2: To Determine Switching, Data Link Layer.
			CO3: Analyze Multiple Access, CDMA, CSMA/CD, CSMA/CA
			CO4: Design to Network Layer.
			CO5: Design and implement UDP and TCP, ATM, Cryptography, Network Security.
43	IV/I	RADAR SYSTEMS	CO1: To understand various technologies involved in the design of radar transmitters and receivers..
			CO2: To learn various like MTI, Doppler and tracking radar and their comparison.
			CO3: Understand radar fundamentals and analysis of the radar signals.
			CO4: Understand various radar transmitters and receivers.
			CO5: Understand various radar like MTI, Doppler and tracking radar and their comparison..
44	IV/I	DIGITAL IMAGE PROCESSING	CO1: To know the fundamentals of Image Processing.
			CO2: To know about various techniques of image enhancement, reconstruction and image compression.
			CO3: Able to apply the Image processing concept for various fields of engineering and real life to process as per needs&specifications.
			CO4: Get the skills to Heuristically develop new techniques to process images of any context.
			CO5: Can experiment, analyze & interpret image data /processing data.

45	IV/I	MICROWAVE & OPTICAL COMMUNICATIONS LABORATORY	CO1: Verify characteristics of Reflex Klystron
			CO2: Analyze various parameters of Waveguide Components.
			CO3: Estimate the power measurements of RF Components such as directional Couplers.
			CO4: Demonstrate characteristics of various optical sources..
			CO5: Measure data Rate, Numerical Aperture and Losses in Optical Link..
46	IV/I	VLSI & EMBEDDED SYSTEMS LABORATORY	CO1: To design and draw the internal structure of the various digital integrated circuits.
			CO2: Develop VHDL/Verilog HDL source code, perform simulation using relevant simulator and analyze the obtained simulation results using necessary synthesizer.
			CO3: Verify the logical operations of the digital IC's
			CO4: Design and simulate the operations of systems using the cc studio software and study the different modes, of operations.
			CO5: Explain the configuration of the embedded controller TIVA TM4C series using USB serial cable.
47	IV/II	LOW POWER VLSI CIRCUITS AND SYSTEMS	CO1: Understand the concepts of velocity saturation, Impact Ionization and Hot Electron Effect .
			CO2: Implement Low power design approaches for system level and circuit level measures.
			CO3: Design low power adders, multipliers and memories for efficient design of systems.
			CO4: Students able to understand deep submicron CMOS technology and digital CMOS design styles
			CO5: To design chips used for battery-powered systems and high-performance circuits.
48	IV/II	RF INTEGRATED CIRCUITS	CO1: Interpret the properties of active and passive components at high frequency
			CO2: Develop RF Components and transmission lines used in RF circuit design.
			CO3: Build independent and interconnected networks
			CO4: Analyze characteristics of RF circuits
			CO5: An ability to design and conduct experiments and interpret data.

Computer and Science Engineering I & II Sem Course Outcomes

SNO	YEAR / SEM	COURSE NAME	COURSE OUT COMES
1	II/I	Discrete Mathematics & Graph Theory	CO 1: Apply mathematical logic to solve problems.
			CO 2: Understand the concepts and perform the operations related to sets, relations and functions.
			CO 3: Gain the conceptual background needed and identify structures of algebraic nature.
			CO 4: Apply basic counting techniques to solve combinatorial problems.
			CO 5: Formulate problems and solve recurrence relations.
2	II/I	Digital Electronics & Microprocessors	CO 1: Design any Logic circuit using basic concepts of Boolean Algebra.
			CO 2: Design any Logic circuit using basic concepts of PLDs.
			CO 3: Design and develop any application using 8086 Microprocessor.
			CO 4: Design and develop any application using 8051 Microcontroller.
			CO 5:
3	II/I	Advanced Data Structures & Algorithms	CO 1: Analyze the complexity of algorithms and apply asymptotic notations.
			CO 2: Apply non-linear data structures and their operations.
			CO 3: Understand and apply greedy, divide and conquer algorithms.
			CO 4: Develop dynamic programming algorithms for various real-time applications.
			CO 5: Illustrate Backtracking algorithms for various applications
4	II/I	Object Oriented Programming Through Java	CO 1: Solve real-world problems using OOP techniques.
			CO 2: Apply code reusability through inheritance, packages and interfaces
			CO 3: Solve problems using java collection framework and I/O classes.
			CO 4: Develop applications by using parallel streams for better performance.
			CO 5: Build GUIs and handle events generated by user interactions.
5	II/I	Computer Organization	CO 1: Understand computer architecture concepts related to the design of modern processors, memories and I/Os
			CO 2: Identify the hardware requirements for cache memory and virtual memory
			CO 3: Design algorithms to exploit pipelining and multiprocessors
			CO 4: Understand the importance and trade-offs of different types of memories.
			CO 5: Identify pipeline hazards and possible solutions to those hazards
6	II/I	Digital Electronics & Microprocessors Lab	CO 1: Design any Logic circuit using basic concepts of Boolean Algebra.
			CO 2: Design any Logic circuit using basic concepts of PLDs.
			CO 3: Design and develop any application using 8086 Microprocessor.
			CO 4: Design and develop any application using 8051 Microcontroller.
			CO 5: Design any Logic circuit using basic concepts of Boolean Algebra.

7	II/I	Advanced Data Structures and Algorithms Lab	CO 1: Understand and apply data structure operations.
			CO 2: Understand and apply non-linear data structure operations.
			CO 3: Apply Greedy, divide and conquer algorithms.
			CO 4: Develop dynamic programming algorithms for various real-time applications.
			CO 5: Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms
8	II/I	Object Oriented Programming Through Java Lab	CO 1: Recognize the Java programming environment.
			CO 2: Develop efficient programs using multithreading
			CO 3: Design reliable programs using Java exception handling features
			CO 4: Extend the programming functionality supported by Java
			CO 5: Select appropriate programming constructs to solve a problem.
9	II/I	Web application Development	CO 1: Construct web sites with valid HTML, CSS, JavaScript
			CO 2: Create responsive Web designs that work on phones, tablets, or traditional laptops and wide screen monitor
			CO 3: Develop websites using jQuery to provide interactivity and engaging user experiences
			CO 4: Embed Google chart tools in a website for better visualization of data.
			CO 5: Design and develop web applications using Content Management Systems like WordPress
10	II/I	Environmental Science	CO 1: Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources
			CO 2: Understand flow and bio-geo- chemical cycles and ecological pyramids.
			CO 3: Understand various causes of pollution and solid waste management and related preventive measures.
			CO 4: About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation
			CO 5: Cases of population explosion, value education and welfare programmes
11	II/II	Deterministic & Stochastic Statistical Methods	CO 1: Apply logical thinking to problem-solving in context
			CO 2: Employ methods related to these concepts in a variety of data science applications.
			CO 3: Use appropriate technology to aid problem-solving and data analysis.
			CO 4: The Bayesian process of inference in probabilistic reasoning system.
			CO 5: Demonstrate skills in unconstrained optimization.
12	II/II	Database Management Systems	CO 1: Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
			CO 2: Enable students to model ER diagrams for any customized application
			CO 3: Inducting appropriate strategies for optimization of queries.
			CO 4: Provide knowledge on concurrency techniques
			CO 5: Demonstrate the organization of Databases
			CO 1: Understand basic concepts and functions of operating systems

14	II/II	Software Engineering	CO 1: Obtain basic software life cycle activity skills.
			CO 2: Obtain basic software life cycle activity skills.
			CO 3: Implement structure, object oriented analysis and design for given problems.
			CO 4: Implement structure, object oriented analysis and design for given problems.
			CO 5: Apply quality management concepts at the application level.
15	II/II	Managerial Economics & Financial Analysis	CO 1: Define the concepts related to Managerial Economics, financial accounting and management
			CO 2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO 3: Apply the Concept of Production cost and revenues for effective Business decision
			CO 4: Analyze how to invest their capital and maximize returns
			CO 5: Develop the accounting statements and evaluate the financial performance of business entity.
16	II/II	Database Management Systems Lab	CO 1: Design database for any real world problem
			CO 2: Implement PL/SQL programs
			CO 3: Define SQL queries
			CO 4: Decide the constraints
			CO 5: Investigate for data inconsistency
17	II/II	Operating Systems Lab	CO 1: Trace different CPU Scheduling algorithms (L2).
			CO 2: Design new scheduling algorithms (L6)
			CO 3: Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3)
			CO 4: Evaluate Page replacement algorithms (L5).
			CO 5: Illustrate shared memory process (L4).
18	II/II	Software Engineering Lab	CO 1: Acquaint with historical and modern software methodologies
			CO 2: Understand the phases of software projects and practice the activities of each phase
			CO 3: Practice clean coding
			CO 4: Take part in project management
			CO 5: Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment
19	II/II	Exploratory Data Analysis with R	CO 1: Install and use R for simple programming tasks.
			CO 2: Extend the functionality of R by using add-on packages
			CO 3: Extract data from files and other sources and perform various data manipulation tasks on them.
			CO 4: Explore statistical functions in R.
			CO 5: Use R Graphics and Tables to visualize results of various statistical operations on data.
20	II/II	Design Thinking for Innovation	CO 1: Define the concepts related to design thinking
			CO 2: Explain the fundamentals of Design Thinking and innovation
			CO 3: Apply the design thinking techniques for solving problems in various sectors.
			CO 4: Analyse to work in a multidisciplinary environment

23	III/I	Object Oriented Analysis Design & Testing	CO 1: Analyze the problem from object oriented perspective
			CO 2: Model complex systems using UML Diagrams
			CO 3: Choose the suitable design patterns in software design
			CO 4: Adapt Object-Oriented Design Principles
			CO 5: Identify the challenges in testing object-oriented software
24	III/I	Computer Networks	CO 1: Identify the software and hardware components of a Computer network
			CO 2: Develop new routing, and congestion control algorithms
			CO 3: Assess critically the existing routing protocols
			CO 4: Explain the functionality of each layer of a computer network
			CO 5: Choose the appropriate transport protocol based on the application requirements
25	III/I	Data warehousing and Data mining	CO 1: Design a Data warehouse system and perform business analysis with OLAP tools
			CO 2: Apply suitable pre-processing and visualization techniques for data analysis
			CO 3: Apply frequent pattern and association rule mining techniques for data analysis
			CO 4: Design appropriate classification and clustering techniques for data analysis
			CO 5: Infer knowledge from raw data
26	III/I	Computer Applications in Food Technology	CO 1: know about the various steps which are related to computer and Software and their application in Food Industries
			CO 2: know about the various steps which are necessary to implement the programs in 'C'
			CO 3: Software and their application in Food Industries
			CO 4: identify the applications to implement c programs
			CO 5: Apply the test cases
27	III/I	Artificial Intelligence Laboratory	CO 1: Implement search algorithms
			CO 2: Solve Artificial intelligence problems
			CO 3: Design chatbot and virtual assistant
			CO 4: Identify and Apply Artificial Intelligence concepts to solve real world problems.
			CO 5: Develop Deep learning programs for Supervised & Unsupervised learning models
28	III/I	Computer Networks Laboratory	CO 1: Design scripts for Wired network simulation
			CO 2: Design scripts of static and mobile wireless networks simulation
			CO 3: Analyze the data traffic using tools
			CO 4: Design JAVA programs for client-server communication
			CO 5: Construct a wired and wireless networks using the real hardware
29	III/I	Object Oriented Analysis Design & Testing Lab	CO 1: Design use case, sequence and collaboration diagrams
			CO 2: Develop the different models to document an Object-oriented design
			CO 3: Demonstrate class level and system integration testing
			CO 4: Draw relevant State Chart and Activity Diagrams for the same system
			CO 5: Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
30	III/I	MANDATORY COURSE:	CO 1: Understand historical background of the constitution making and its importance for building a democratic India
			CO 2: Understand the functioning of three wings of the government ie., executive, legislative and judiciary

31	III/II	Cryptography & Network Security	CO 1: Introduce the basic categories of threats to computers and networks
			CO 2: Illustrate various cryptographic algorithms
			CO 3: Demonstrate public-key cryptosystem
			CO 4: Discuss the fundamental ideas of public-key cryptography.
			CO 5: Explore Web security threats and protection mechanisms
32	III/II	Big Data Analytics	CO 1: Understand the basic concepts and importance of Big Data
			CO 2: Familiarize with the installation of Hadoop and how to analyze the Big Data
			CO 3: Understand the design concepts of HDFS
			CO 4: Provide good insight for developing a MapReduce applications
			CO 5: Understand Hadoop environment.
33	III/II	English Communication	CO 1: Facilitate active listening to enable inferential learning through expert lectures and talks
			CO 2: Impart critical reading strategies for comprehension of complex texts
			CO 3: Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids
			CO 4: Demonstrate good writing skills for effective paraphrasing, argumentative essays and formal correspondence
			CO 5: Encourage use of a wide range of grammatical structures and vocabulary in speech and writing
34	III/II	Design Patterns	CO 1: Understand design patterns and their underlying objects oriented concepts
			CO 2: Learn the day-to-day problems faced by object-oriented designers and how design patterns solve them
			CO 3: Provide an interface for creating families of related objects without specifying their concrete classes.
			CO 4: Construct design solutions by using behavioral patterns.
			CO 5: Apply structural patterns to solve design problems
35	III/II	Soft Skills	CO 1: Understand basic concepts and its methodologies
			CO 2: Demonstrate the knowledge of research processes
			CO 3: Read, comprehend and explain research articles in their academic discipline
			CO 4: Analyze various types of testing tools used in research
			CO 5: Design a research paper without any ethical issues

36	III/II	Managerial Economics And Financial Analysis	CO 1: Define the concepts related to Managerial Economics, financial accounting and management
			CO 2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO 3: Apply the Concept of Production cost and revenues for effective Business decision
			CO 4: Analyze how to invest their capital and maximize returns
			CO 5: Develop the accounting statements and evaluate the financial performance of business entity.
37	III/II	Big Data Analytics Laboratory	CO 1: Get familiar with Hadoop distributions, configuring Hadoop and performing File management tasks
			CO 2: Experiment MapReduce in Hadoop frameworks
			CO 3: Implement MapReduce programs in variety applications
			CO 4: Explore MapReduce support for debugging
			CO 5: Understand different approaches for building Hadoop MapReduce programs for real-time applications
38	III/II	English Communication lab	CO 1: Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
			CO 2: Apply communication skills through various language learning activities
			CO 3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension
			CO 4: Evaluate and exhibit acceptable etiquette essential in social and professional settings
			CO 5: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
39	III/II	Mandatory Course: Research Methodology	CO 1: Understand basic concepts and its methodologies
			CO 2: Demonstrate the knowledge of research processes
			CO 3: Read, comprehend and explain research articles in their academic discipline
			CO 4: Analyze various types of testing tools used in research
			CO 5: Design a research paper without any ethical issues
40	IV/I	GRID AND CLOUD COMPUTING	CO 1: Apply the security models in the grid and the cloud environment.
			CO 2: Use the grid and cloud tool kits.
			CO 3: Apply the concept of virtualization.
			CO 4: Apply grid computing techniques to solve large scale scientific problems
			CO 5: Understand the concept of Cloud Security.
41	IV/I	INFORMATION SECURITY	CO 1: Protect the network from both internal and external attacks
			CO 2: Design of new security approaches
			CO 3: Ability to choose the appropriate security algorithm based on the requirements
			CO 4: Demonstrate knowledge of security objectives and policy development.
			CO 5: Demonstrate knowledge of the profession, its organizations, goals and leadership roles, literature/publications, issues, and research foundations.

42	IV/I	MOBILE APPLICATION DEVELOPMENT	CO 1: Create data sharing with different applications and sending and intercepting SMS.
			CO 2: Develop applications using services and publishing android applications.
			CO 3: To demonstrate their skills of using Android software development tools
			CO 4: You'll build a Movie Listing App using TheMovieDB REST API
			CO 5: You'll learn about layouts by building a contact profile page for Android device's address book.
43	IV/I	SOFTWARE ARCHITECTURE	CO 1: Design and motivate software architecture for large scale software systems
			CO 2: Recognize major software architectural styles, design patterns, and frameworks
			CO 3: Describe a software architecture using various documentation approaches and architectural
			CO 4: Generate architectural alternatives for a problem and select among them
			CO 5: Use well-understood paradigms for designing new systems
44	IV/I	SOFTWARE PROJECT MANAGEMENT	CO 1: Describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
			CO 2: Compare and differentiate organization structures and project structures
			CO 3: Implement a project to manage project schedule, expenses and resources with the application of suitable project management tools
			CO 4: Determine an appropriate project management approach through an evaluation of the business context and scope of the project.
			CO 5: Identify and describe the key phases of project management.
45	IV/I	GRID AND CLOUD COMPUTING LABORATORY	CO 1: Design and Implement applications on the Cloud.
			CO 2: Design and implement applications on the Grid.
			CO 3: Use the grid and cloud tool kits.
			CO 4: Implement the Theorem using Naive Bayes Approach.
			CO 5: Connect Multiple System Using Zonal Server and Jvishwa
46	IV/I	MOBILE APPLICATION DEVELOPMENT LABORATORY	CO 1: Create data sharing with different applications and sending and intercepting SMS.
			CO 2: Develop applications using services and publishing android applications.
			CO 3: To demonstrate their skills of using Android software development tools
			CO 4: Deploy applications to the Android marketplace for distribution.
			CO 5: Design push notifications for incoming messages
47	IV/II	INNOVATIONS AND IT MANAGEMENT	CO 1: Ability to do Business over the Internet.
			CO 2: Ability to solve Business problems by applying analytics.
			CO 3: Ability to use ICT to participate in Democratic process.
			CO 4: Ability to do business C2C
			CO 5: Ability to design a Business Process
48	IV/II	Cyber Security	CO 1: Analyze threats and risks within context of the cyber security architecture
			CO 2: Appraise cyber security incidents to apply appropriate response
			CO 3: Evaluate decision making outcomes of cyber security scenarios
			CO 4: Cyber Crime – Sociological and Criminological Perspectives
			CO 5: Concepts of Criminology

Computer and Science Engineering (AI) I & II Sem Course Outcomes

SNO	YEAR / SEM	COURSE NAME	COURSE OUT COMES
1	II/I	Discrete Mathematics & Graph Theory	CO 1: Apply mathematical logic to solve problems.
			CO 2: Understand the concepts and perform the operations related to sets, relations and functions.
			CO 3: Gain the conceptual background needed and identify structures of algebraic nature.
			CO 4: Apply basic counting techniques to solve combinatorial problems.
			CO 5: Formulate problems and solve recurrence relations.
2	II/I	Digital Electronics & Microprocessors	CO 1: Design any Logic circuit using basic concepts of Boolean Algebra.
			CO 2: Design any Logic circuit using basic concepts of PLDs.
			CO 3: Design and develop any application using 8086 Microprocessor.
			CO 4: Design and develop any application using 8051 Microcontroller.
			CO 5: Design any Logic circuit using basic concepts of Boolean Algebra.
3	II/I	Advanced Data Structures & Algorithms	CO 1: Analyze the complexity of algorithms and apply asymptotic notations.
			CO 2: Apply non-linear data structures and their operations.
			CO 3: Understand and apply greedy, divide and conquer algorithms.
			CO 4: Develop dynamic programming algorithms for various real-time applications.
			CO 5: Illustrate Backtracking algorithms for various applications
4	II/I	Object Oriented Programming Through Java	CO 1: Solve real-world problems using OOP techniques.
			CO 2: Apply code reusability through inheritance, packages and interfaces
			CO 3: Solve problems using java collection framework and I/O classes.
			CO 4: Develop applications by using parallel streams for better performance.
			CO 5: Build GUIs and handle events generated by user interactions.
5	II/I	Computer Organization	CO 1: Understand computer architecture concepts related to the design of modern processors, memories and I/Os
			CO 2: Identify the hardware requirements for cache memory and virtual memory
			CO 3: Design algorithms to exploit pipelining and multiprocessors
			CO 4: Understand the importance and trade-offs of different types of memories.
			CO 5: Identify pipeline hazards and possible solutions to those hazards
6	II/I	Digital Electronics & Microprocessors Lab	CO 1: Design any Logic circuit using basic concepts of Boolean Algebra.
			CO 2: Design any Logic circuit using basic concepts of PLDs.
			CO 3: Design and develop any application using 8086 Microprocessor.
			CO 4: Design and develop any application using 8051 Microcontroller.
			CO 5: Design any Logic circuit using basic concepts of Boolean Algebra.

7	II/I	Advanced Data Structures and Algorithms Lab	CO 1: Understand and apply data structure operations.
			CO 2: Understand and apply non-linear data structure operations.
			CO 3: Apply Greedy, divide and conquer algorithms.
			CO 4: Develop dynamic programming algorithms for various real-time applications.
			CO 5: Illustrate and apply backtracking algorithms, further able to understand non-deterministic algorithms
8	II/I	Object Oriented Programming Through Java Lab	CO 1: Recognize the Java programming environment.
			CO 2: Develop efficient programs using multithreading
			CO 3: Design reliable programs using Java exception handling features
			CO 4: Extend the programming functionality supported by Java
			CO 5: Select appropriate programming constructs to solve a problem.
9	II/I	Web application Development	CO 1: Construct web sites with valid HTML, CSS, JavaScript
			CO 2: Create responsive Web designs that work on phones, tablets, or traditional laptops and wide screen monitor
			CO 3: Develop websites using jQuery to provide interactivity and engaging user experiences
			CO 4: Embed Google chart tools in a website for better visualization of data.
			CO 5: Design and develop web applications using Content Management Systems like WordPress
10	II/I	Environmental Science	CO 1: Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources
			CO 2: Understand flow and bio-geo- chemical cycles and ecological pyramids.
			CO 3: Understand various causes of pollution and solid waste management and related preventive measures.
			CO 4: About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation
			CO 5: Cases of population explosion, value education and welfare programmes
11	II/II	Deterministic & Stochastic Statistical methods	CO 1: Apply logical thinking to problem-solving in context
			CO 2: Employ methods related to these concepts in a variety of data science applications.
			CO 3: Use appropriate technology to aid problem-solving and data analysis.
			CO 4: The Bayesian process of inference in probabilistic reasoning system.
			CO 5: Demonstrate skills in unconstrained optimization.

12	II/II	Database Management Systems	CO 1: Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.
			CO 2: Enable students to model ER diagrams for any customized application
			CO 3: Inducting appropriate strategies for optimization of queries.
			CO 4: Provide knowledge on concurrency techniques
			CO 5: Demonstrate the organization of Databases
13	II/II	Operating Systems	CO 1: Understand basic concepts and functions of operating systems
			CO 2: Understand the processes, threads and scheduling algorithms
			CO 3: Provide good insight on various memory management techniques
			CO 4: Expose the students with different techniques of handling deadlocks
			CO 5: Explore the concept of file-system and its implementation issues
14	II/II	Artificial Intelligence	CO 1: Apply searching techniques for solving a problem
			CO 2: Design Intelligent Agents
			CO 3: Develop Natural Language Interface for Machines
			CO 4: Design mini robots
			CO 5: Summarize past, present and future of Artificial Intelligence
15	II/II	Managerial Economics & Financial Analysis	CO 1: Define the concepts related to Managerial Economics, financial accounting and management
			CO 2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
			CO 3: Apply the Concept of Production cost and revenues for effective Business decision
			CO 4: Analyze how to invest their capital and maximize returns
			CO 5: Develop the accounting statements and evaluate the financial performance of business entity.

16	II/II	Database Management SystemsLab	CO 1: Design database for any real world problem
			CO 2: Implement PL/SQL programs
			CO 3: Define SQL queries
			CO 4: Decide the constraints
			CO 5: Investigate for data inconsistency
17	II/II	Operating SystemsLab	CO 1: Trace different CPU Scheduling algorithms (L2).
			CO 2: Design new scheduling algorithms (L6)
			CO 3: Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3)
			CO 4: Evaluate Page replacement algorithms (L5).
			CO 5: Illustrate shared memory process (L4).
18	II/II	Software Engineering Lab	CO 1: Acquaint with historical and modern software methodologies
			CO 2: Understand the phases of software projects and practice the activities of each phase
			CO 3: Practice clean coding
			CO 4: Take part in project management
			CO 5: Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment
19	II/II	Exploratory Data Analysis with R	CO 1: Install and use R for simple programming tasks.
			CO 2: Extend the functionality of R by using add-on packages
			CO 3: Extract data from files and other sources and perform various data manipulation tasks on them.
			CO 4: Explore statistical functions in R.
			CO 5: Use R Graphics and Tables to visualize results of various statistical operations on data.
20	II/II	Design Thinking for Innovation	CO 1: Define the concepts related to design thinking
			CO 2: Explain the fundamentals of Design Thinking and innovation
			CO 3: Apply the design thinking techniques for solving problems in various sectors.
			CO 4: Analyse to work in a multidisciplinary environment
			CO 5: Evaluate the value of creativity

Humanities & Sciences I & II Sem Course Outcomes

S.NO.	YEAR/ SEM	COURSE NAME	COURSE OUTCOMES
1	I-I	Linear Algebra and Calculus	CO 1:The student will be able to develop the use of matrix algebra techniques that is needed by engineers for practical applications
			CO 2:The student will be able to Utilize mean value theorems to real life problems
			CO 3:The student will be able to familiarize with functions of several variables which is useful in optimization
			CO 4:The student will be able to Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
			CO 5:The student will be able to Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions
2	I-I	Engineering Physics	CO 1:The student will be able to explain physics applied to solve engineering problems
			CO 2:The student will be able to apply the principles of acoustics in designing of buildings
			CO 3:The student will be able to explains the applications of ultrasonic's in various engineering fields
			CO 4:The student will be able to apply electromagnetic wave propagation in different Optical Fibers
			CO 5:The student will be able to Apply the lasers concepts in various applications
3	I-I	Communicative English	CO 1:The learners will be able to Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
			CO 2:The learners will be able to Apply grammatical structures to formulate sentences and correct word forms
			CO 3:The learners will be able to Analyze discourse markers to speak clearly on a specific topic in informal discussions
			CO 4:The learners will be able to Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
			CO 5:The learners will be able to Create a coherent paragraph interpreting a figure/graph/chart/table
			CO 1:The student will be able to Operate various optical instruments
			CO 2:The student will be able to Estimate wavelength of laser

5	I-I	Communicative English Lab	CO 1:Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
			CO 2:Apply communication skills through various language learning activities
			CO 3:Analyze the English speech sounds, stress, rhythm, intonation and syllable Division for better listening and speaking comprehension.
			CO 4:Evaluate and exhibit acceptable etiquette essential in social and professional settings
			CO 5:Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English
6	I-I	APPLIED PHYSICS	CO 1:The student will be able to identify the wave properties of light and the interaction of energy with the matter
			CO 2:The student will be able to apply electromagnetic wave propagation in different guided media
			CO 3:The student will be able to assess the electromagnetic wave propagation and its power in different media
			CO 4:The student will be able to calculate conductivity of semiconductors
			CO 5:The student will be able to interpret the difference between normal conductor and superconductor and The student will be able to demonstrate the application of nanomaterials.
7	I-I	Applied Physics Lab	CO 1:The student will be able to operate optical instruments like microscope and spectrometer
			CO 2:The student will be able to determine thickness of a hair/paper with the concept of interference
			CO 3:The student will be able to estimate the wavelength of different colors using diffraction grating and resolving power
			CO 4:The student will be able to evaluate the acceptance angle of an optical fiber and numerical aperture
			CO 5:The student will be able to calculate the band gap of a given semiconductor
8	I-I	Engineering Chemistry	CO 1:The student will be able to demonstrate the corrosion prevention methods and factors affecting corrosion
			CO 2:The student will be able to explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers
			CO 3:The student will be able to explain calorific values, octane number, refining of petroleum and cracking of oils
			CO 4:The student will be able explain the setting and hardening of cement and concrete phase
			CO 5:The student will be able to summarize the application of SEM, TEM and X-ray diffraction in surface

10	I-I	Engineering Graphics Lab	CO 1:The student will be able to draw various curves applied in engineering
			CO 2:The student will be able to show projections of solids and sections graphically
			CO 3:The student will be able to draw the development of surfaces of solids
			CO 4:The student will be able to use computers as a drafting tool
			CO 5:The student will be able to draw isometric and orthographic drawings using CAD packages
11	I-I	Chemistry	CO 1:The student will be able to compare the materials of construction for battery and electrochemical sensors
			CO 2:The student will be able to explain the preparation, properties, and applications of thermoplastics &thermosettings, elastomers & conducting polymers
			CO 3:The student will be able to explain the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures
			CO 4:The student will be able to apply the principle of supramolecules chemistry in application of molecular machines and switches
			CO 5:The instrumental methods, molecular machines and switches and the familiarize engineering chemistry and its applications
12	I-I	Chemistry Lab	CO 1:The student will be able to determine the cell constant and conductance of solutions
			CO 2:The student will be able to prepare advanced polymer materials
			CO 3:The student will be able to measure the strength of an acid present in secondary batteries
			CO 4:The student will be able to analyze the IR and NMR of some organic compounds
			CO 5:Measure the strength of an acid present in secondary batteries
13	I-I	Basic Electrical & Electronics Engineering Lab	CO 1:The student will be able to Describe construction, working and characteristics of diodes, transistors and operational amplifiers
			CO 2:The student will be able to Demonstrate how electronic devices are used for applications such as rectification, switching and amplification
			CO 3:The student will be able to Build different building blocks in digital electronics using logic gates
			CO 4:The student will be able to Explain functionality of flip-flops, shift registers and counters for data processing .
			CO 5:The student will be able to Explain functioning of various communication systems
		C-	CO 1:To illustrate the basic concepts of C programming language

16	I-I	Engineering Drawing	CO 1:Bring awareness that Engineering Drawing is the Language of Engineers CO 2:Familiarize how industry communicates technical information CO 3:Teach the practices for accuracy and clarity in presenting the technical information CO 4:Develop the engineering imagination essential for successful design
17	I-I	Engineering Workshop	CO 1:The student will be able to apply wood working skills in real world applications. CO 2:The student will be able to build different parts with metal sheets in real world applications CO 3:The student will be able to apply fitting operations in various applications. CO 4:The student will be able to apply different types of basic electric circuit connections CO 5:The student will be able to demonstrate soldering and brazing
18	I-I	IT WORKSHOP	CO 1:To make the students know about the internal parts of a computer, assembling and disassembling a computer from the parts CO 2:preparing a computer for use by installing the operating system. CO 3:To provide Technical training to the students on Productivity tools like Word processors, CO 4:The Spreadsheets, Presentations and LaTeX CO 5:To learn about Networking of computers and use Internet facility for Browsing and Searching.
19	I-I	Engineering Chemistry Lab	CO 1:The student will be able to determine the cell constant and conductance of solutions CO 2:The student will be able to prepare advanced polymer materials CO 3:The student will be able to determine the physical properties like surface tension, adsorption and viscosity CO 4:The student will be able to estimate the Iron and Calcium in cement CO 5:The student will be able to calculate the hardness of water
20	I-I	FUNDAMENTALS OF ELECTRICAL CIRCUITS	CO 1:Network Topology and concepts like Tree, Cut-set, Tie-set, Loop, Co-Tree CO 2:Network theorems and their applications CO 3:Series and parallel resonances, bandwidth, current locus diagrams CO 4:The Single Phase AC circuits and concepts of real power, reactive power, complex power, CO 5:Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various.

21	I-I	FUNDAMENTALS OF ELECTRICAL CIRCUITS LAB	CO 1:Remember, understand and apply various theorems and verify practically.
			CO 2:Understand and analyze active, reactive power measurements in three phase balanced & unbalanced circuits.
			CO 3:Series and parallel resonances, bandwidth, current locus diagrams
			CO 4:Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various.
			CO 5:THE reactive power measurements in three phase balanced & unbalanced circuits.
22	I-II	Probability and Statistics	CO 1:The student will be able to make use of the concepts of probability and their applications
			CO 2:The student will be able to apply discrete and continuous probability distributions
			CO 3:The student will be able to classify the concepts of data science and its importance
			CO 4:The student will be able to interpret the association of characteristics and through correlation and regression tools
			CO 5:The student will be able to design the components of a classical hypothesis test
23	I-II	Engineering Physics	CO 1:The student will be able to explain physics applied to solve engineering problems
			CO 2:The student will be able to apply the principles of acoustics in designing of buildings
			CO 3:The student will be able to explain the applications of ultrasonic's in various engineering fields
			CO 4:The student will be able to apply electromagnetic wave propagation in different Optical Fibers
			CO 5:The student will be able to Apply the lasers concepts in various applications
24	I-II	Communicative English	CO 1:The learners will be able to Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
			CO 2:The learners will be able to Apply grammatical structures to formulate sentences and correct word forms
			CO 3:The learners will be able to Analyze discourse markers to speak clearly on a specific topic in informal discussions
			CO 4:The learners will be able to Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
			CO 5:The learners will be able to Create a coherent paragraph interpreting a figure/graph/chart/table
		Engineering Physics Lab	CO 1:The student will be able to Operate various optical instruments
			CO 2:The student will be able to Estimate wavelength of laser and particles size using laser

26	I-II	Communicative English Lab	CO 1:Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
			CO 2:Apply communication skills through various language learning activities
			CO 3:Analyze the English speech sounds, stress, rhythm, intonation and syllable Division for better listening and speaking comprehension.
			CO 4:Evaluate and exhibit acceptable etiquette essential in social and professional settings
			CO 5:Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
27	I-II	APPLIED PHYSICS	CO 1:The student will be able to identify the wave properties of light and the interaction of energy with the matter
			CO 2:The student will be able to apply electromagnetic wavepropagation in different guided media
			CO 3:The student will be able to assess the electromagnetic wave propagation and its power in different media
			CO 4:The student will be able to calculate conductivity of semiconductors
			CO 5:The student will be able to interpret the difference between normal conductor and superconductor and The student will be able to demonstrate the application of nanomaterials
28	I-II	Applied Physics Lab	CO 1:The student will be able to operate optical instruments likemicroscope and spectrometer
			CO 2:The student will be able to determine thickness of a hair/paper with the concept of interference
			CO 3:The student will be able to estimate the wavelength ofdifferent colors using diffraction grating and resolving power
			CO 4:The student will be able to evaluate the acceptance angle of an optical fiber and numerical aperture
			CO 5:The student will be able to calculate the band gap of agiven semiconductor
29	I-II	Engineering Chemistry	CO 1:The student will be able to demonstrate the corrosion prevention methods and factors affecting corrosion
			CO 2:The student will be able to explain the preparation, properties, and applications of thermoplastics & thermosetting,elastomers & conducting polymers
			CO 3:The student will be able to explain calorific values, octane number, refining of petroleum and cracking of oils
			CO 4:The student will be able explain the setting and hardening of cement and concrete phase
			CO 5:The student will be able to summarize the application of SEM, TEM and X-ray diffraction in surface characterization
		PYTHON PROGRAMMING &	CO 1:To provide an overview of Deep Learning and Data Science models.
			CO 2:To learn the fundamentals of Python.

31	I-II	Engineering Graphics Lab	CO 1:The student will be able to draw various curves applied in engineering
			CO 2:The student will be able to show projections of solids and sections graphically
			CO 3:The student will be able to draw the development of surfaces of solids
			CO 4:The student will be able to use computers as a drafting tool
			CO 5:The student will be able to draw isometric and orthographic drawings using CAD packages
32	I-II	Chemistry	CO 1:The student will be able to compare the materials of construction for battery and electrochemical sensors
			CO 2:The student will be able to explain the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers
			CO 3:The student will be able to explain the principles of spectrometry, GC and HPLC in separation of gaseous and liquid mixtures
			CO 4:The student will be able to apply the principle of supramolecules chemistry in application of molecular machines and switches
			CO 5:The instrumental methods, molecular machines and switches and The familiarize engineering chemistry and its applications.
33	I-II	Chemistry Lab	CO 1:The student will be able to determine the cell constant and conductance of solutions
			CO 2:The student will be able to prepare advanced polymer materials
			CO 3:The student will be able to measure the strength of an acid present in secondary batteries
			CO 4:The student will be able to analyze the IR and NMR of some organic compounds
			CO 5:Measure the strength of an acid present in secondary batteries
34	I-II	PYTHON PROGRAMMING & DATA SCIENCE LAB	CO 1:To elucidate solving mathematical problems using Python programming language
			CO 2:To train the students in solving computational problems
			CO 3:To understand the fundamentals of Python programming concepts and its applications.
			CO 4:Practical understanding of building different types of models and their evaluation
			CO 5:To introduce preliminary concepts in Pattern Recognition and Machine learning.
35	I-II	C- PROGRAMMING & DATA STRUCTURES	CO 1:To illustrate the basic concepts of C programming language
			CO 2:To discuss the concepts of Functions, Arrays, Pointers and Structures.
			CO 3:To familiarize with Stack, Queue and Linked lists data structure
			CO 4: To explain the concepts of non-linear data structures like graphs and trees.
			CO 5: To learn different types of searching and sorting techniques.
36	I-II	C- PROGRAMMING & DATA STRUCTURES LAB	CO 1: To get familiar with the basic concepts of C programming.
			CO 2:To design programs using arrays, strings, pointers and structures
			CO 3:To illustrate the use of Stacks and Queue
			CO 4:To apply different operations on linked list
			CO 5: To demonstrate Binary search tree traversal techniques and to design searching and sorting techniques.

37	I-II	Engineering Drawing	CO 1:Bring awareness that Engineering Drawing is the Language of Engineers
			CO 2:Familiarize how industry communicates technical information
			CO 3:Teach the practices for accuracy and clarity in presenting the technical information
			CO 4: Develop the engineering imagination essential for successful design
38	I-II	Engineering Workshop	CO 1:The student will be able to apply wood working skills in real world applications.
			CO 2:The student will be able to build different parts with metal sheets in real world applications
			CO 3:The student will be able to apply fitting operations in various applications.
			CO 4:The student will be able to apply different types of basic electric circuit connections
39	I-II	IT WORKSHOP	CO 5:The student will be able to demonstrate soldering and brazing
			CO 1:To make the students know about the internal parts of a computer, assembling and disassembling a computer from the parts
			CO 2:preparing a computer for use by installing the operating system.
			CO 3:To provide Technical training to the students on Productivity tools like Word processors,
40	I-II	Engineering Chemistry Lab	CO 4:The Spreadsheets, Presentations and LaTeX
			CO 5:To learn about Networking of computers and use Internet facility for Browsing and Searching.
			CO 1:The student will be able to determine the cell constant and conductance of solutions
			CO 2:The student will be able to prepare advanced polymer materials
41	I-II	STRENGTH OF MATERIALS	CO 3:The student will be able to determine the physical properties like surface tension, adsorption and viscosity
			CO 4:The student will be able to estimate the Iron and Calcium in cement
			CO 5:The student will be able to calculate the hardness of water
			CO 1:To demonstrate the student to determine the centroid and second moment of area
42	I-II	STRENGTH OF MATERIALS LAB	CO 2:To make the student understand how to resolve forces and moments in a given system
			CO 3:To impart procedure for drawing shear force and bending moment diagrams for beams.
			CO 4:To make the student able to analyze flexural stresses in beams due to different loads.
			CO 5:To enable the student to apply the concepts of strength of materials in engineering
42	I-II	STRENGTH OF MATERIALS LAB	CO 1:By performing this laboratory, the student will be able to know the structural behavior of various materials.
			CO 2:By performing the various tests in this laboratory the student will be able to know the structural
			CO 3:The various structural elements when subjected to external loads
			CO 4:To make the student understand how to resolve forces and moments in a given system
42	I-II	STRENGTH OF MATERIALS LAB	CO 5:To enable the student to apply the concepts of strength of materials in engineering

43	I-II	ELECTRONIC DEVICES & CIRCUITS	CO 1:To understand the basic principles of all semiconductor devices.
			CO 2:To be able to solve problems related to diode circuits, and amplifier circuits
			CO 3:To be able to compare the performance of BJTs and MOSFETs
			CO 4:To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.
			CO 5:To design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.
44	I-II	ELECTRONIC DEVICES & CIRCUITS LAB	CO 1:To verify the theoretical concepts practically from all the experiments.
			CO 2:To analyse the characteristics of Diodes, BJT, MOSFET, UJT.
			CO 3:To design the amplifier circuits from the given specifications
			CO 4:To Model the electronic circuits using tools such as PSPICE/Multisim.
			CO 5:To be able to compare the performance of BJTs and MOSFETs
45	I-II	MATERIAL SCIENCE & ENGINEERING	CO 1:To teach the principles of physical metallurgy, i.e. crystallography of metals, constitution of alloys, phase diagrams.
			CO 2:Expose commercially important metals and alloys (both ferrous and non ferrous)
			CO 3:THE engineering constraints. Explain the methods to change the properties of materials through heat treatment processes
			CO 4:Familiarize properties and applications of ceramics, polymers and composite materials
			CO 5:To analyse the characteristics of Diodes, BJT, MOSFET, UJT.
46	I-II	MATERIAL SCIENCE & ENGINEERING LAB	CO 1:To understand the microstructure and hardness of engineering materials.
			CO 2:To explain grain boundaries and grain sizes of different engineering materials.
			CO 3:Differentiate hardness of super alloys, ceramics and polymeric materials
			CO 4:Differentiate various microstructures of ferrous and non-ferrous metals and alloys.
			CO 5:Evaluate hardness of treated and untreated steels.
47	I-II	Differential Equations and Vector Calculus	CO 1:The student will be able to solve the differential equations related to various engineering fields
			CO 2:The student will be able to identify solution methods for partial differential equations that model physical processes
			CO 3:The student will be able to interpret the physical meaning of different operators such as gradient, curl and divergence
			CO 4:The student will be able to estimate the work done against a field, circulation and flux using vector calculus

MBA I & II Sem Course Outcomes

SNO	YEAR/SEM	SUBJECT	COURSE OUTCOMES
1	I-I	Management & Organizational Behaviour	CO 1:Understand concepts, theories and practices of management
			CO 2:Apply theoretical knowledge in managing the organization and Know the behaviour of employees at individual
			CO 3:understand concepts, theories of personality and motivation
			CO 4:Group and organisational levels at work place under different leadership styles and theories
			CO 5:understand concepts of organizational behaviour and culture and climate
2	I-I	Business Environment & Law	CO 1:Acquire the knowledge on business policies and environment factors to carryout a business
			CO 2:Understand the various laws relating to business activities
			CO 3:Conduct & plan business effectively & efficiently
			CO 4:update the laws & policies related to business environment
			CO 5:acquire the information on various business policies & laws
3	I-I	Managerial Economics	CO 1:Understand the relationship of Managerial economics with other functional areas.
			CO 2:Learn the techniques and methods to predict the demand scientifically
			CO 3:Ascertain production levels and analyse the relationship of Cost-Volume Profit.
			CO 4:Take informed decisions on price fixation under different market structures of the economy under different scenario.
			CO 5:Understand the Inflation and business cycle
4	I-I	Financial Accounting for Managers	CO 1:To introduce accounting, rules and accounting process
			CO 2:Prepare the financial statements with accounting knowledge
			CO 3: the assets of the business organizations under different methods
			CO 4:Analyse the financial performance and position of the business organization and interpret the results from the point of company and investor
			CO 5:Steps in preparation of funds flow and cash flow statements
5	I-I	Statistics for Managers	CO 1:Understand statistical techniques popularly used to describe the data in managerial decision making.
			CO 2:Know the procedure involved in inferential statistics and appropriate tests for given data.
			CO 3:Learn the computational skill , interpretation of results of the data analysis.
			CO 4:Knowing the Computational probability distribution.
			CO 5:Analyse and differentiate various types of data distribution and its probability distribution.
6	I-I	Management Information Systems	CO 1:Know Management of Information system scope, application and challenges in managing MIS.
			CO 2:Understand traditional and modern approaches for data resource management and models.
			CO 3:Understand using of information system applications and analyse knowledge management
			CO4:Evaluate product based and process based cost and benefit to implement and maintain MIS in an organization.

7	I-I	Business Communication Practice	CO 1:Understand the communication concepts
			CO 2:Improve communication skills
			CO 3:Improve competence skills
			CO 4:Obtain and apply proficiency in business communication at the workplace and professional contexts.
			CO 5:Learn the writing and interview skills
8	I-I	Information Technology Lab	CO 1:Prepare and edit the documents with effective presentation to superiors.
			CO 2:Obtain hands of experience in designing and editing the templates and data in the excel sheets with formulae and functions.
			CO 3:To test and interpret the business data outcome statistically in an effective and efficient manner
			CO4:Improve effective presentation design skills
			CO 5:Understand handling technology for effective work
9	I-II	Financial Management	CO 1:Learn the roles and goals of finance manager in a corporate structure business
			CO 2:Acquire decision making skills regarding financing, investing, and corporate restructuring in the present competitive business environment.
			CO 3:Analyse the impact of capital structure on wealth maximization of owners and value of the company.
			CO 4:Manage current assets and current liabilities of the company in an effective and efficient way.
			CO 5:To educate on corporate restructures and corporate governance.
10	I-II	Marketing Management	CO 1:Understand the concepts of marketing and marketing strategies suitable for different products under different market environments
			CO 2:Analyse consumer markets so as to tap global markets for the products.
			CO 3:Learn the designing managing, creating & communicating value to the business in digitalised market environment
			CO 4:Manage and design the logistics for retailing and wholesaling
			CO 5:Integrating marketing channels for business organizations
11	I-II	Human Resource Management	CO 1:Know the nature, scope, functions, roles, goals, strategies and policies of HR management.
			CO 2:Learn to design and develop HR planning related aspects.
			CO 3:Acquires knowledge on administration of monetary and non monetary benefits for the employees in the organization.
			CO 4:Knowing the Human Resource Performance Appraisal and Development
			CO 5:Learn recent trends in human resource and to balance the work life in the present dynamic work environment

12	I-II	Business Research Methods	CO 1:Learn types of business research, technology used in business research in technological era.
			CO 2:Identify research problem, appropriate research design and sample design for the problem, formulate hypothesis, testing process of hypothesis.
			CO 3:Understand sources of data, instruments to collect data, analyse and interpretation of data.
			CO 4:Evaluate data preparation to solve problems
			CO 5:Prepare and present the research report effectively and efficiently.
13	I-II	Operations Research	CO 1:Formulate linear programming problems and appreciate their limitations
			CO 2:Model linear programming problems like the transportation
			CO 3:Solve simple games using various techniques
			CO 4:Model a dynamic system as a queuing model to compute performance measures.
			CO 5:Acquire the skills to complete a project effectively and efficiently with in the given resources.
14	I-II	Operations Management	CO 1 :Understand the concept of Production and Operations Management.
			CO 2:Construct and interpret simple control charts for both continuous and discrete data.
			CO 3:Gain knowledge on the quality philosophies and principles of deming, Juran, six sigma and to become acquainted with the International Organization for Standardization's ISO 9000:2000 requirements.
			CO 4:Familiarize with inventory concepts to support the development of useful quantitative models for inventory management.
			CO 5:Understand the drivers and enablers of Industry
15	I-II	E-Business	CO 1:Understand electronic business and related concepts in detail.
			CO 2:Identify security threat in e-business and steps, methods to overcome security issues.
			CO 3:Know various electronic payment system and business models in the present technology business world.
			CO 4:Understand E-Business application models and business strategies
			CO 5:Know the e-business infrastructure requirements for e-business.

16	I-II	Data Analytics Lab	CO 1:Learn basic operations of excel like creating, editing, formatting worksheets.
			CO 2:Apply knowledge of excel to store and retrieve data relating to marketing
			CO 3:Construct and present employee salary administration using advanced excel.
			CO 4:Present data in the form of pivot tables, graphs and charts by applying advanced excel functions.
			CO 5:Understand information system using internet survey tools.
17	II-I	Business Ethics & Corporate Governance	CO 1:Explore the relationship between ethics and business and the subsequent theories of justice and economics across different cultural traditions.
			CO 2:Comprehend the relationship between ethics, morals and values in the workplace.
			CO 3: Analyze and understand various ethical philosophies to explain how they contribute to current management practices.
			CO 4:Critically apply understanding of ethics of real-world contexts and gather and analyse information by way of undertaking a research project on a topic relevant to business ethics.
			CO 5:Critically analyze the reasons of systematic failure of corporate governance that could spread from individual firms to entire markets or economies.
18	II-I	Green Business Management	CO 1:To understand concept of green business management.
			CO 2:To know the environmental and sustainability issues for the production and CER
			CO 3:To describe and identify indicators of sustainability and bio-diversity at Indian perspective.
			CO 4:To study green techniques and methods
			CO 5:To build eco-commerce models for green business projects and companies.
19	II-I	Entrepreneurship Development	CO 1:Understand the nature and forms of entrepreneurship.
			CO 2:Understand the institutional finance supporting to entrepreneurship.
			CO 3:Create and design a project report by evaluating feasibility studies.
			CO 4:Understand the importance of MSME's
			CO 5:Understand the importance of women entrepreneurship, Rural industrialization and the role of NGO's
20	II-I	Product and Brand Management	CO 1:Identify the concepts of product classification and product characteristics
			CO 2:Understand concept of product management
			CO 3:Know the different types of brands and its importance
			CO 4:Understand the importance of managing brand equity
			CO 5:Understand the branding value in different type of sectors

21	II-I	Human Resource Development	CO 1:To understand concept of green business management.
			CO 2:To know the environmental and sustainability issues for the production and CER
			CO 3:To describe and identify indicators of sustainability and bio-diversity at Indian perspective.
			CO 4:To study green techniques and methods
			CO 5:To build eco-commerce models for green business projects and companies.
22	II-I	Financial Institutions and Services	CO 1:Define and understand financial system in an economy and components of financial system
			CO 2:Gain knowledge on classification of financial institutions, markets and type services of institutions
			CO 3:To compare and contrast the pros and cons of each type of services available in the financial market.
			CO 4:To distinguish the various financial markets and institutions and their functioning mechanism
			CO 5:Acquire knowledge on entire banking system and types of banks and functioning of banks in the financial system
23	II-I	Labor laws and Legislation	CO 1:Acquire knowledge on various labour related legislations
			CO 2:Enables to capture the significant elements of laws to run an industry.
			CO 3:Acquire knowledge on Laws relating to remuneration wages,bonus acts
			CO 4:Able to understand Laws relating to industrial Relations
			CO 5:Understand the Laws relating to social security
24	II-I	Investment and Portfolio Management	CO 1:Understand the overview of stock markets and process of investment
			CO 2:Analyse the security under different types before investing in stocks
			CO 3:Ascertain risk and return value of different securities and portfolio
			CO 4:Acquire knowledge on Valuation of Securities
			CO 5:Learn various portfolio theories, models to manage portfolio and maximise the portfolio returns
25	II-I	Performance Management	CO 1:Understand performance management concept and distinguish performance management and Human resource management
			CO 2:Learn the concept of mentoring , process, types and pitfalls.
			CO 3:Explain coaching and counseling for performance improvement and steps involved in counseling process.
			CO 4:Design and apply different appraisal systems in an organization.
			CO 5:prepare reward and compensation policy, determine factors influencing fringe benefits in the reward and compensation policy.

26	II-I	Advertising and Sales Promotion Management	CO 1:To understand concept of green business management.
			CO 2:To know the environmental and sustainability issues for the production and CER
			CO 3:To describe and identify indicators of sustainability and bio-diversity at Indian perspective.
			CO 4:To study green techniques and methods
			CO 5:To build eco-commerce models for green business projects and companies.
27	II-I	Knowledge Management	CO 1:understand concepts of knowledge management,techniques of km
			CO 2:identify types knowledge in any organization,knowledge life cycle,process and conversion of knowledge
			CO 3:know road blocks to sucessful implementation of Km and information architecture for KM
			CO 4:Grasp the significance of information technology in KM,and bench marks in KM
			CO 5:Deduce the future of Kmparticularly in manufacturing and service sector
28	II-I	Business Simulation Lab	CO 1:Understand electronic business and related concepts in detailt
			CO 2:Identify security threat in e-business and steps, methods to overcome security issues.
			CO 3:Understand Know various electronic payment system
			CO 4:Business models in the present technology business world
			CO 5:Know the e-business infrastructure requirements for e-business.
29	II-II	Strategic Management	CO 1:To describe and discuss the strategic management process & build skills to develop strategic vision, mission objectives
			CO 2:To explain concepts of core competence, strategy for complete advantage
			CO 3:To give an understanding about strategic analytical tools and techniques
			CO 4:To provide knowledge on strategy formulation, types of strategies to implement
			CO 5:To create awareness on various strategy evaluation and controlling approaches
30	II-II	E-Business	CO 1:Understand electronic business and related concepts in detailt
			CO 2:Identify security threat in e-business and steps, methods to overcome security issues.
			CO 3:Understand Know various electronic payment system
			CO 4:Business models in the present technology business world
			CO5:Know the e-business infrastructure requirements for e-business.

31	II-II	Services Marketing	CO 1:Understand the concept of services marketing
			CO2:Identify the factors that influence customer expectations of service
			CO 3:Analyze the different pricing and promotion strategies of services.
			CO 4:Know the role of communication strategies in service marketing
			CO 5:Understand the marketing plans and services
32	II-II	Organization Development	CO 1:Understand concepts of Organization Development
			CO 2:Know foundations of OD
			CO 3:Acquire knowledge on Action Research and
			CO 4:Classify interventions at intergroup, third party level, and also structural interventions and comprehensive interventions
			CO 5:Understand power politics in OD and the future of OD.
33	II-II	International Financial Management	CO 1:Understand concept of International financial Management and difference between domestic FM and IFM
			CO 2:Understand about Foreign exchange markets.
			CO 3:Understand the concept of exchange exposure and risk.
			CO 4:Apply capital budgeting techniques to take an effective cross –border investment decision.
			CO 5:Identify the nature of working capital management in MNC's financing decision.
34	II-II	Global Human Resource Management	CO 1:To describe and discuss the strategic management process & build skills to develop strategic vision, mission objectives
			CO 2:To explain concepts of core competence, strategy for complete advantage
			CO 3:To give an understanding about strategic analytical tools and techniques
			CO 4:To provide knowledge on strategy formulation, types of strategies to implement
			CO 5:To create awareness on various strategy evaluation and controlling approaches

M.TECH (VLSI) I , II & III Sem Course Outcomes

S.NO.	YEAR/S EM	SUBJECT	COURSE OUTCOMES
1	SEM-I	CMOS Analog IC Design	CO1:Design MOSFET based analog integrated circuits.
			CO2:Analyze analog circuits at least to the first order.
			CO3:Appreciate the trade-offs involved in analog integrated circuit design.
			CO4:Understand and appreciate the importance of noise and distortion in analog circuits.
			CO5: Analyze complex engineering problems critically in the domain of analog IC design for conducting research
2	SEM-I	CMOS Digital IC Design	CO1:Demonstrate advanced knowledge in Static and dynamic characteristics of CMOS
			CO2:Estimate Delay and Power of Adders circuits.
			CO3:Classify different semiconductor memories.
			CO4:Analyze, design and implement combinational and sequential MOS logic circuits.
			CO5: Analyze complex engineering problems critically in the domain of digital IC design for conducting research.
3	SEM-I	CAD for VLSI	CO1:Establish comprehensive understanding of the various phases of CAD for digital electronic systems, from digital logic simulation to physical design, including test and verification.
			CO2:Demonstrate knowledge and understanding of fundamental concepts in CAD and to establish capability for CAD tool development and enhancement.
			CO3:Practice the application of fundamentals of VLSI technologies
			CO4:Optimize the implemented design for area, timing and power by applying suitable constraints.
4	SEM-I	FPGA Architectures and Applications	CO1:Acquire knowledge about various architectures and device technologies of PLD's.
			CO2:Comprehend FPGA Architectures.
			CO3:Analyze System level Design and their application for Combinational and Sequential Circuits.
			CO4:Familiarize with Anti-Fuse Programmed FPGAs.
			CO5: Apply knowledge of this subject for various design applications.
5	SEM-I	CMOS Analog IC Design Lab	CO1:Explain the VLSI Design Methodologies using VLSI design tool.
			CO2:Grasp the significance of various CMOS analog circuits in full-custom IC Design flow
			CO3:Explain the Physical Verification in Layout Design
			CO4:Fully appreciate the design and analyze of analog and mixed signal simulation
			CO5: Grasp the Significance of Pre-Layout Simulation and Post-Layout Simulation
			CO1:Explain the VLSI Design Methodologies using any VLSI design tool.
			CO2:Grasp the significance of various design logic Circuits in full-custom IC Design.

7	SEM-I	Research Methodology and IPR	CO1:Analyze research related information
			CO2:Follow research ethics
			CO3:Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.
			CO4:Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.
			CO5: Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits.
8	SEM-I	English for Research paper writing	CO1:Understand the significance of writing skills and the level of readability
			CO2:Analyze and write title, abstract, different sections in research paper
			CO3:Develop the skills needed while writing a research paper
9	SEM-II	CMOS Mixed Signal IC Design	CO1: Demonstrate first order filter with least interference
			CO2:Extend the concept of phase locked loop for designing PLL application with minimum jitter by considering non ideal effects.
			CO3:Design different D/A Converters for real time applications
			CO4:Design different A/D Converters for real time applications
			CO5: Design different modulators, demodulators and different filter for real time applications
10	SEM-II	Physical Design Automation	CO1:Understand relation between automation algorithms and constraints posed by VLSI technology.
			CO2:Adopt algorithms to meet critical design parameters.
			CO3:Design area efficient logics by employing different routing algorithms and shape functions.
			CO4:Simulate and synthesis different combinational and sequential logics.
11	SEM-II	SoC Testing and Verification	CO1:Understand the concepts of faults and testing in SoC
			CO2:To implement the faults using simulation tools
			CO3:To analyze BIST systems

12	SEM-II	Low Power VLSI Design	CO1:Understand the concepts of velocity saturation, Impact Ionization and Hot Electron Effect
			CO2:Implement Low power design approaches for system level and circuit level measures.
			CO3:Design low power adders, for efficient design of systems.
			CO4:Design low power multipliers for efficient design of systems.
			CO5: Design low power memories for efficient design of systems.
13	SEM-II	CMOS Mixed Signal IC Design Lab	CO1:Design and simulate op-amp for given specifications
			CO2:Design and simulate data converter for given specifications
			CO3:Design and simulate PLL and VCO for given specifications
			CO4:Understand the Significance of Pre-Layout Simulation and Post-Layout Simulation.
14	SEM-II	Physical Design Automation Lab	CO1:Learn the implementation of different Physical Design Automation algorithms
			CO2:Implement different graph algorithms
			CO3:Implement different partitioning algorithms
			CO4:Implement different floor planning algorithms
			CO5: Implement different routing algorithms
15	SEM-II	Stress Management for Yoga	CO1:Develop healthy mind in a healthy body thus improving social health also
			CO2:Improve efficiency
16	SEM-III	SoC Architecture	CO1:Understand the basics related to SoC architecture and different approaches related to SoC Design.
			CO2:Select an appropriated robust processor for SoC Design
			CO3:Select an appropriate memory for SoC Design.
			CO4:Realize real time case studies
17	SEM-III	Waste to Energy	CO1:To know about overview of Energy to waste and classification of waste.
			CO2:To acquire knowledge on bio mass pyrolysis, gasification, combustion and conversion process in detail.
			CO3:To gain knowledge on properties of biogas, biomass resources and programmes to convert waste to energy in India.