




VAAGESWARI COLLEGE OF ENGINEERING

Beside LMD Police Station, Ramakrishna Colony,
KARIMNAGAR, Telangana state – 505 527
Affiliated to Jawaharlal Nehru Technological University Hyderabad,
Approved by AICTE New Delhi

B. TECH - CIVIL ENGINEERING

R18 Regulation

Course Outcomes		
Course Title with Code	#	Statement
C201 Mathematics MA301BS	CO1	Differentiation and integration of complex valued functions
	CO2	Evaluation of integrals using Cauchy's integral formula, Residue theorem
	CO3	Laurent's series expansion of complex functions
	CO4	Express a periodic function by Fourier series and a non-periodic function by Fourier transform
	CO5	To analyze the displacements of one dimensional wave and distribution of one dimensional heat equation
C202(Strength of Materials - I - CE302ES)	CO1	Analyze the statically determinate and indeterminate problems
	CO2	Analyze shear force and bending moments in beams
	CO3	Determine the stresses and strains in the members subjected to axial bending
	CO4	Evaluate slope and deflection of beams subjected to loads
	CO5	Determine the principal stresses and strains in the structural members
C204(Building Materials, Construction and Planning - CV304ES)	CO1	Identify various building materials required for construction & planning.
	CO2	Analyse the importance of mineral and chemical admixtures, requirements of the concrete in construction
	CO3	Explain different types of lintel, arches and the materials which are commonly used for construction.
	CO4	Understand masonry, english and flemish bonds. finishing plastering painting and know about building services.
	CO5	Principle of building planning and by laws and standards of building material Components and orientation of the building.
C205(Surveying - CE305ES)	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 measurement errors and apply corrections
C206(Strength of Materials Lab - CE306ES)	CO1	Conduct tension test on Materials like steel etc.
	CO2	Conduct compression tests on spring, wood and concrete
	CO3	Conduct flexural and torsion test to determine elastic constants

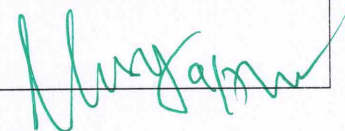

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	CO5	Conduct impact test on Materials like aluminum, cast iron and mild steel.
C207 Computer Aided Design – I Lab –CE307ES)	CO1	Software for CAD – Introduction to different software's and Practice exercises on CAD software
	CO2	Drawing of plans of buildings using software a) Single storied buildings b) multi storied buildings
	CO3	Developing sections and elevations for a) Single storied buildings b) multi storied buildings
	CO4	Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software's
	CO5	Exercises on development of working drawings of buildings
C209(Gender Sensitization Lab - *MC300HS)	CO1	Students will have developed a better understanding of important issues related to gender in contemporary India. .
	CO2	Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.
	CO3	Students will attain a finer grasp of how gender discrimination works in our society and how to counter it
	CO4	Students will acquire insight into the gendered division of labor and its relation to politics and economics
	CO5	Men and women students and professionals will be better equipped to work and live together as equals.
C210(Strength of Materials - II - CE401ES)	CO1	Determine stresses in the member subjected to Torsion
	CO2	Analyze columns and struts
	CO3	Understand the concept of direct and bending stresses
	CO4	Analyze and design springs, thin and thick cylinders
	CO5	Understand the concept of unsymmetrical bending
C211(Fluid Mechanics - II - CE402ES)	CO1	Understand the concepts of channel flows.
	CO2	Compute flow profiles in channel transitions and analyze hydraulic transients
	CO3	Design the working proportions of hydraulic machines
	CO4	Understand the working principles for various and working of different components of Kaplan, Francis and Pelton turbines.
	CO5	Understand the concept of NPSH, performance of pumps and working efficiency.
C212(Structural Analysis -CE403ES)	CO1	Analyze Perfect , Imperfect And Redundant Frames
	CO2	Formulate Equilibrium and compatibility equations for structural members
	CO3	Analyze one dimensional and two dimensional problems using classical methods
	CO4	Analyze indeterminate structures
	CO5	Analyze structures for gravity loads, moving loads and lateral loads
C213(Engineering Geology - CE404ES)	CO1	Understand weathering process and mass movement.
	CO2	Distinguish geological formations.
	CO3	Identify geological structures and processes for rock mass quality.
	CO4	Identify subsurface information and groundwater potential sites through geophysical investigations.

	CO5	Apply geological principles for mitigation of natural hazards and select sites for dams and tunnels.
Engineering	CO1	Understand the elasticity of the demand of the product, different types, measurement of elasticity of demand and factors influencing on elasticity of demand.
C214(Business Economics & Financial Analysis - SM405MS)		Enumerate the features, price-output determination under Perfect Competition, Monopoly and Monopolistic competition Markets.
	CO2	Illustrate the Significance of financial accounting, double entry system, accounts, accounting concepts and convention
	CO3	Study the firm's financial position by analyzing the Financial Statements of a Company
	CO4	Understand the elasticity of the demand of the product, different types, measurement of elasticity of demand and factors influencing on elasticity of demand.
	CO5	Enumerate the features, price-output determination under Perfect Competition, Monopoly and Monopolistic competition Markets.
C216(Surveying – II Lab – CE408ES)	CO1	Determine of area using total station
	CO2	Traversing using total station
	CO3	Contouring using total station
	CO4	Determination of remote height using total station
	CO5	Finding position of stations using G.P.S
C217(Engineering geology Lab - CE407ES)	CO1	Study of physical properties and identification of minerals referred under theory
	CO2	Megascopic description and identification of rocks referred under theory and Microscopic study of rocks
	CO3	Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc
	CO4	Simple Structural Geology problems
	CO5	Electrical resistivity meter
C218(Environmental Science and Technology – *MC400ES)	CO1	Improve his/her pronunciation.
	CO2	Take part in role-plays and perform effectively in real-life situations.
	CO3	Choose appropriate words and phrases to make effective telephonic conversations
	CO4	Minimize stage fear and make effective presentations.
	CO5	Build sustained conversations.
Engineering Exploration(A4022)	CO1	Describe various types of ecosystems its components and inter-relationship between man and environment
	CO2	Understand the relevance and importance of the natural resources in the sustenance of life on earth and living standard.
	CO3	Explain on threats and innovative methods for conservation of biodiversity
	CO4	Ability to use methods, and strategies to investigate and interpret the pollution problems.
	CO5	Understand the importance of EIA for developmental activities to have minimum negative impacts on people
C301(Concrete Technology -	CO1	Identify quality control tests on concrete making materials

CE501PC	CO2	Understand the behavior of fresh and hardened concrete
	CO3	Design concrete mixes as per IS and ACI Codes
	CO4	Understand the durability requirements of concrete
	CO5	Understand the need for special concretes
C302(Design of Reinforced Concrete Structures – CE502PC)	CO1	Design RC Structural elements
	CO2	Design the Reinforced concrete beams using limit state Design
	CO3	Design Reinforced concrete slabs
	CO4	Design the Reinforced Concrete Columns and footings
	CO5	Design structures for serviceability, staircases , canopy
C303(Water Resources Engineering – CE503PC)	CO1	Understand the importance of hydrology and able to calculate the average rainfall over a basin, losses from the rainfall such as evaporation, evapo-transpiration, infiltration etc.
	CO2	Understand hydrograph methods, the types of hydrograph and their applications, the concept of ground water and its occurrence.
	CO3	Understand the Occurrence of Ground water and complete concept of well development
	CO4	Analyze the importance of irrigation, types and methods required for various types of crops during various seasons and stages of growth and its method of application.
	CO5	Design of canals by using different methods like Kennedys and lacey's theorem.
C304(Fundamentals of Management- SM504MS)	CO1	The students understand the significance of Management in their Profession.
	CO2	The various Management Functions like Planning, Organizing
	CO3	The various Management Functions like, Staffing, Leading
	CO4	The various Management Functions like Motivation and Control aspects are learnt in this course.
	CO5	The students can explore the Management Practices in their domain area.
C305(Fundamentals of mechanical engineering)	CO1	Understand the scope of mechanical engineering
	CO2	Its impact on society
	CO3	Know about different fields of applications of Mechanical Engineering
	CO4	Its interrelationship with other fields of science and engineering.
	CO5	Development of current specializations under Mechanical Engineering and their scope.
C306(Concrete Technology Lab – CE505PC)	CO1	To Understand the Properties of concrete materials and behavior of concrete
	CO2	To Understand the concept of fresh concrete
	CO3	To Understand the properties hardened concrete
	CO4	Design and test concrete mix
	CO5	Conduct Non-destructive tests on concrete
C307(Geographic Information Systems Lab – CE506PC)	CO1	To understand the concept of Geographical information system
	CO2	Georeferencing of cadastral map & AutoCAD Maps
	CO3	Digitization & GIS coordination
	CO4	Mapping the field problems and solution convergence through GIS

	CO5	Analyze spatial and attribute data for solving spatial problems.
C308(Hydraulics and Hydraulic Machinery Lab – CE507PC)	CO1	Compute drag coefficients
	CO2	Test the performance of pumps and turbines
	CO3	Determine Manning's and Chezy's coefficients for smooth and rough channels
	CO4	Determine energy loss in hydraulic jump and calibrate standing wave flume
	CO5	Calibrate flow discharge measuring device used in pipe channels and tanks.
C309(Professional Ethics – *MC500HS)	CO1	The students identify the importance of human values and skills for sustained happiness.
	CO2	The students strike a balance between profession and personal happiness/goals.
	CO3	The students realize / explain the significance of trust, mutually satisfying human behavior and enriching interaction with nature.
	CO4	The students develop / propose appropriate technologies
	CO5	Management patterns to create harmony in professional and personal life
C310(Design of Steel Structures –CE601PC)	CO1	Design tension and compression members
	CO2	Design beams and beam columns
	CO3	Design bolt and weld connections
	CO4	Design built up members and column base
	CO5	Design of plate girders and roof trusses
C311(Environmental Engineering – CE602PC)	CO1	Analyze characteristics of water and wastewater
	CO2	Estimate the quantity of drinking water and domestic wastewater generated
	CO3	Design components of water supply systems and design sewerage system
	CO4	Design skimming tank, grit chambers, sedimentation tanks, septic tank and sludge digestion tank.
	CO5	Ability to analyze, examine different physical, chemical and biological properties of water
C312 (Soil Mechanics (CE603PC)	CO1	Understand the mechanism behavior of soil for different loads
	CO2	Analyze the properties and factors of permeability
	CO3	Evaluate the various stress distribution of soils
	CO4	Understand the principles of compaction and its control., Compute and analyze the consolidation settlements
	CO5	Identify shear strength parameters for field conditions.
C313(Ground Water Development and Management.– CE613PE)	CO1	Understand ground water occurrence
	CO2	Understand Water Movement
	CO3	Evaluate groundwater resources using geophysical methods
	CO4	Model regional groundwater flow

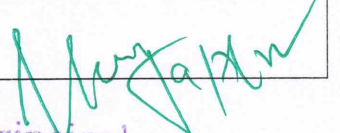


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C314(Soil Mechanics Lab – CE604PC)	CO1	Determine index properties of soils
	CO2	Classify soils
	CO3	Determine engineering properties of soils
	CO4	Determine the coefficient of consolidation
	CO5	Determine the shear strength parameters of soil
C315(Computer Aided Design - II Lab –CE605PC)	CO1	Detailing of reinforcement in cantilever , simply supported and continuous beams
	CO2	Detailing of reinforcement in canopy & columns
	CO3	Detailing of reinforcement in RC isolated footings square, one-way to two-way slabs, rectangular, circular and combined footings, dog-legged staircases
	CO4	Drawing of steel bolted, welded connections, steel compression and tension members
	CO5	Drafting of steel beams-built-up sections, steel plate girder and steel roof truss.
C316(Advanced English Communication Skills Lab – EN606HS)	CO1	Acquire vocabulary and use it contextually
	CO2	Listen and speak effectively
	CO3	Develop proficiency in academic reading and writing
	CO4	Increase possibilities of job prospects
	CO5	Communicate confidently in formal and informal contexts
C401(Transportation Engineering- CE701PC)	CO1	Understand the plan and highway network.
	CO2	Design of highway geometries.
	CO3	Understand the traffic engineering parameters & its regulation.
	CO4	Understand the patterns of interaction design.
	CO5	Design of flexible and rigid pavements.
C402 (Estimation Quantity Surveying and Valuation- CE702PC)	CO1	Explain the different types of estimator.
	CO2	Prepare detailed estimate and bar bending schedule for different the element.
	CO3	Estimate the earthwork for roads and canals.
	CO4	Evaluate the rates for various item of work in the rate analysis.
	CO5	Apply standard specifications, prepare contract documents and evaluate the valuates of buildings.
C403(Rehabilitation and Retrofitting of Structures- CE724PE)	CO1	Recognize the mechanism of deterioration of structures and various maintenance.
	CO2	Able of examine the damages occurred in reinforced concrete building.
	CO3	Evaluate the existing buildings through field investigations.
	CO4	Understand and use the different techniques for repairs and structural retrofitting.
	CO5	Adopt methods in health monitoring of structures.
C404(Ground Improvement)	CO1	Identify different types of soils and institute and laboratory tests to characterize soils.
	CO2	Classify various mechanical modification techniques like blasting, vibro

Techniques- CE733PE)		compaction, dynamic compaction and compaction piles.
	CO3	Identify various dewatering methods, their choice and various hydraulic ground modification techniques.
	CO4	Apply the concept of soil modification by physical and chemical methods.
	CO5	Explain soil reinforcement technique, reinforcement with strip, insitu ground reinforcement, ground anchors and soil nailing.
C405(Irrigation and Hydraulic Structures- CE744PE)	CO1	Identify various types of reservoir & twin design aspects.
	CO2	Analyze & design of gravity dam.
	CO3	Classification and design of earthen dams & spillways.
	CO4	Plan and design diversion head works.
	CO5	Explain the concept of cross drainage works.
C406(Transportation Engineering Lab- CE703PC)	CO1	Identify the properties and behavior of highway material for different loading patterns.
	CO2	Understand the properties of highway material by conducting specific gravity & water absorption.
	CO3	Understand techniques to characterize various pavement material through relevant test.
	CO4	Understand the different types of traffic studies.
	CO5	Able to understand the types of parking studies.
C407(Environmental Engineering Lab- CE704PC)	CO1	Categorize the different physical, chemical & biological properties of water
	CO2	Categorize the different physical, chemical & biological properties of water
	CO3	Find the PH in given water sample.
	CO4	Find the chemicals content in water sample.
	CO5	Determine the alkalinity & acidity the water sample.
C408(Industry Oriented Mini Project-CE705PC)	CO1	Enrich the concept of the construction techniques, equipment used.
	CO2	Enrich the knowledge of project planning through visiting sites.
	CO3	To enhance the knowledge in software skills.
	CO4	Able to prepare the document works.
	CO5	Generate models for various construction techniques & equipment.
409(Seminar- CE706PC)	CO1	Able to show the competence in identifying relevant information defining and explaining topic.
	CO2	Understand when to speak and how much to say.
	CO3	Demonstrates clarity the strengths their statement.
	CO4	Able to make use of visual audio & audio visual to support their PPT.
	CO5	Planning speech presentation in a compelling, well structures logical sequence.
410(Total Quality Management- ME831OE)	CO1	To know what is Total Quality Management how it is going to implemented in real time in manufacturing and service industry.
	CO2	To prerequisite of TQM and how to maintained the relationship with the customer, and evaluation of Bench marking in manufacturing and service industry.
	CO3	Evaluation of seven tools of TQM and how to maintain the Quality circles in real-time in manufacturing and service industry.
	CO4	Understanding the Cost of Quality of different companies of different sectors in Accounting system and Quality management system.
	CO5	How to maintained the different certifications of ISO in manufacturing and service industry.

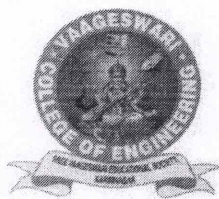

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411(Pavement Design-CE852PE)	CO1	Characterize the response characteristics of soil, aggregate, asphalt & asphalt mixes.
	CO2	Analyze flexible pavements
	CO3	Analyze rigid pavements
	CO4	Design a flexible pavement using IRC, Asphalt Institute & AASHTO methods
	CO5	Design a rigid pavement using IRC and AASHTO methods.
412(Industrial Waste Water Treatment-CE864PE)	CO1	Recall the technical knowledge gained from previous courses
413(Major Project-CE801PC)	CO2	Select equipment usage in the laboratories concerned with the project
	CO3	Apply project management skills (scheduling work, procuring parts and documenting expenditures and working within the confines of a deadline).
	CO4	Analyze, develop and demonstrate methodology used for the experiments for the concerned projects in civil Engineering
	CO5	Conclude from obtained technical information by means of written reports

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE OUTCOMES (COs)

B.Tech. II Year I Sem R18 Regulation Electrical And Electronics Engineering

Course Code	Course Title / Name	Course Outcomes
EE301ES	Engineering Mechanics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Determine resultant of forces acting on a body and analyse equilibrium of a body subjected to a system of forces.</p> <p>CO2: Solve problem of bodies subjected to friction.</p> <p>CO3: Find the location of centroid and calculate moment of inertia of a given section.</p> <p>CO4: Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, rotatory motion and rigid body motion.</p> <p>CO5: Solve problems using work energy equations for translation, fixed axis rotation and plane motion and solve problems of vibration.</p>
EE302PC	Electrical Circuit Analysis	<p>At the end of this course, each student should be able to:</p> <p>CO1: Apply network theorems for the analysis of electrical circuits.</p> <p>CO2: Obtain the transient and steady-state response of electrical circuits.</p> <p>CO3: Analyze circuits in the sinusoidal steady-state (single-phase and three-phase).</p> <p>CO4: Analyze two port circuit behavior.</p>
EE303PC	Analog Electronics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know the characteristics, utilization of various</p>


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		<p>components.</p> <p>CO2: Understand the biasing techniques</p> <p>CO3: Design and analyze various rectifiers, small signal amplifier circuits.</p> <p>CO4: Design sinusoidal and non-sinusoidal oscillators.</p> <p>CO5: A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.</p>
EE304PC	Electrical Machines - I	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify different parts of a DC machine & understand its operation</p> <p>CO2: Carry out different testing methods to predetermine the efficiency of DC machines</p> <p>CO3: Understand different excitation and starting methods of DC machines</p> <p>CO4: Control the voltage and speed of a DC machines</p> <p>CO5: Analyze single phase and three phase transformers circuits.</p>
EE305PC	Electromagnetic Fields	<p>At the end of this course, each student should be able to:</p> <p>CO1: To understand the basic laws of electromagnetism.</p> <p>CO2: To obtain the electric and magnetic fields for simple configurations under static conditions.</p> <p>CO3: To analyze time varying electric and magnetic fields.</p> <p>CO3: To understand Maxwell's equation in different forms and different media.</p> <p>CO4: To understand the propagation of EM waves.</p>
EE306PC	Electrical Machines Lab - I	<p>At the end of this course, each student should be able to:</p> <p>CO1: Start and control the Different DC Machines.</p> <p>CO2: Assess the performance of different machines using different testing methods</p> <p>CO3: Identify different conditions required to be satisfied for self - excitation of DC Generators.</p> <p>CO4: Separate iron losses of DC machines into</p>


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		different components
EE307PC	Analog Electronics Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know the characteristics, utilization of various components.</p> <p>CO2: Understand the biasing techniques</p> <p>CO3: Design and analyze various rectifiers, small signal amplifier circuits.</p> <p>CO4: Design sinusoidal and non-sinusoidal oscillators.</p> <p>CO5: A thorough understanding, functioning of OP-AMP, design OP-AMP based circuits with linear integrated circuits.</p>
EE308PC	Electrical Circuits Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze complex DC and AC linear circuits</p> <p>CO2: Apply concepts of electrical circuits across engineering</p> <p>CO3: Evaluate response in a given network by using theorems</p>
*MC309	Gender Sensitization Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students will have developed a better understanding of important issues related to gender in contemporary India.</p> <p>CO2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.</p> <p>CO3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.</p> <p>CO4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.</p> <p>CO5: Men and women students and professionals will be better equipped to work and live</p>

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		<p>together as equals.</p> <p>CO6: Students will develop a sense of appreciation of women in all walks of life.</p> <p>CO7: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.</p>
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B.Tech. II Year II Sem R18 Regulation Electrical and Electronics Engineering

Course Code	Course Title / Name	Course Outcomes
MA401BS	Laplace Transforms, Numerical Methods & Complex variables	<p>At the end of this course, each student should be able to:</p> <p>CO1: Use the Laplace transforms techniques for solving ODE's</p> <p>CO2: Find the root of a given equation.</p> <p>CO3: Estimate the value for the given data using interpolation</p> <p>CO4: Find the numerical solutions for a given ODE's</p> <p>CO5: Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.</p> <p>CO6: Taylor's and Laurent's series expansions of complex Function</p>
EE402PC	Electrical Machines – II	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the concepts of rotating magnetic fields.</p> <p>CO2: Understand the operation of ac machines.</p> <p>CO3: Analyze performance characteristics of ac machines.</p>


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EE403PC	Digital Electronics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand working of logic families and logic gates.</p> <p>CO2: Design and implement Combinational and Sequential logic circuits.</p> <p>CO3: Understand the process of Analog to Digital conversion and Digital to Analog conversion.</p> <p>CO4: Be able to use PLDs to implement the given logical problem.</p>
EE404PC	Control Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the modeling of linear-time-invariant systems using transfer function and statespace representations.</p> <p>CO2: Understand the concept of stability and its assessment for linear-time invariant systems.</p> <p>CO3: Design simple feedback controllers.</p>
EE405PC	Power System - I	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the concepts of power systems.</p> <p>CO2: Understand the operation of conventional generating stations and renewable sources of electrical power.</p> <p>CO3: Evaluate the power tariff methods.</p> <p>CO4: Determine the electrical circuit parameters of transmission lines</p> <p>CO5: Understand the layout of substation and underground cables and corona.</p>
EE406PC	Digital Electronics Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand working of logic families and logic gates.</p> <p>CO2: Design and implement Combinational and Sequential logic circuits.</p> <p>CO3: Understand the process of Analog to Digital conversion and Digital to Analog conversion.</p> <p>CO4: Be able to use PLDs to implement the given logical problem.</p>

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EE407PC	Electrical Machines Lab - II	<p>At the end of this course, each student should be able to:</p> <p>CO1: Assess the performance of different machines using different testing methods</p> <p>CO2: To convert the Phase from three phase to two phase and vice versa</p> <p>CO3: Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods</p> <p>CO4: Control the active and reactive power flows in synchronous machines</p> <p>CO5: Start different machines and control the speed and power factor</p>
EE408PC	Control Systems Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application</p> <p>CO2: Apply various time domain and frequency domain techniques to assess the system performance</p> <p>CO3: Apply various control strategies to different applications (example: Power systems, electrical drives etc)</p> <p>CO4: Test system controllability and observability using state space representation and applications of state space representation to various systems</p>



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*MC409	Constitution of India	<p>At the end of this course, each student should be able to:</p> <p>CO1 : Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration.</p> <p>CO2: Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.</p> <p>CO3: Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.</p> <p>CO4: Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.</p>
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B.Tech. III Year I Sem R18 Regulation Electrical and Electronics Engineering

Course Code	Course Title / Name	Course Outcomes
EE501PE	Power Electronics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the differences between signal level and power level devices.</p> <p>CO2: Analyze controlled rectifier circuits.</p> <p>CO3: Analyze the operation of DC-DC choppers.</p> <p>CO4: Analyze the operation of voltage source inverters.</p>

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EE502PE	Power System-II	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze transmission line performance.</p> <p>CO2: Apply load compensation techniques to control reactive power.</p> <p>CO3: Understand the application of per unit quantities.</p> <p>CO4: Design over voltage protection and insulation Coordination.</p> <p>CO5: Determine the fault currents for symmetrical and unbalanced faults.</p>
EE503PE	Measurements and Instrumentation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand different types of measuring instruments, their construction, operation and characteristics</p> <p>CO2: Identify the instruments suitable for typical measurements</p> <p>CO3: Apply the knowledge about transducers and instrument transformers to use them effectively.</p> <p>CO4: Apply the knowledge of smart and digital metering for industrial applications</p>
EE511PE	Professional Elective-I: Computer Architecture	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the concepts of microprocessors, their principles and practices.</p>
		<p>CO2: Write efficient programs in assembly language of the 8086 family of microprocessors.</p> <p>CO3: Organize a modern computer system and be able to relate it to real examples.</p> <p>CO4: Develop the programs in assembly language for 80286, 80386 and MIPS processors in real and protected modes.</p> <p>CO5: Implement embedded applications using ATOM processor.</p>

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EE512PE	Professional Elective-I: High Voltage Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the basic physics related to various breakdown processes in solid, liquid and gaseous insulating materials.</p> <p>CO2: Knowledge of generation and measurement of D. C., A.C., & Impulse voltages.</p> <p>CO3: Knowledge of tests on H. V. equipment and on insulating materials, as per the standards.</p> <p>CO4: Knowledge of how over-voltages arise in a power system, and protection against these overvoltages.</p>
EE513PE	Professional Elective-I: Electrical Machine Design	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the construction and performance characteristics of electrical machines.</p> <p>CO2: Understand the various factors which influence the design: electrical, magnetic and thermal loading of electrical machines</p> <p>CO3: Understand the principles of electrical machine design and carry out a basic design of an ac machine.</p> <p>CO4: Use software tools to do design calculations.</p>
SM504MS	Business Economics and Financial Analysis	<p>At the end of this course, each student should be able to:</p> <p>The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.</p>
EE505PC	Power System Simulation Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Perform various transmission line calculations</p> <p>CO2: Understand Different circuits time constants</p> <p>CO3: Analyze the experimental data and draw the conclusions.</p>

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EE506PC	Power Electronics Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the operating principles of various power electronic converters.</p> <p>CO2: Use power electronic simulation packages & hardware to develop the power converters.</p> <p>CO3: Analyze and choose the appropriate converters for various applications</p>
EE507PC	Measurements and Instrumentation Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: To choose instruments</p> <p>CO2: Test any instrument</p> <p>CO3: Find the accuracy of any instrument by performing experiment</p> <p>CO4: Calibrate PMMC instrument using D.C potentiometer</p>
EN508HS	Advanced Communication Skills Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: To improve fluency in English through a well developed vocabulary and enable them to listen at normal conversational speed by educated English speakers and respond appropriately in different socio cultural and professional context</p> <p>CO2: Further, they would be required to communicate their ideas relevantly and coherently in writing</p> <p>CO3: To prepare all the students for their placements</p> <p>CO4: Learn to overcome stage fear and make presentations with ease</p> <p>CO5: Learn how to pronounce words using the</p>
		rules they have been taught

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*MC510	Intellectual Property Rights	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.</p> <p>CO2: Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.</p> <p>CO3: Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.</p> <p>CO4: Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.</p> <p>CO5: Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.</p> <p>CO6: Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;</p>
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Course Code	Course Title / Name	Course Outcomes
	Open Elective - I	
EE611PE	Professional Elective-II Optimization Techniques	<p>At the end of this course, each student should be able to:</p> <p>CO1: explain the need of optimization of engineering systems</p> <p>CO2: understand optimization of electrical and electronics engineering problems</p> <p>CO3: apply classical optimization techniques, linear programming, simplex algorithm, transportation problem</p> <p>CO4: apply unconstrained optimization and constrained non-linear programming and dynamic programming</p> <p>CO5: Formulate optimization problems.</p>
EE612PE	Professional Elective-II Power Semiconductor Drives	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the drawbacks of speed control of motor by conventional methods.</p> <p>CO2: Differentiate Phase controlled and chopper-controlled DC drives speed-torque characteristics merits and demerits</p> <p>CO3: Understand Ac motor drive speed–torque characteristics using different control strategies its merits and demerits</p> <p>CO4: Describe Slip power recovery schemes</p>
EE613PE	Professional Elective-II Wind and Solar Energy systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the energy scenario and the consequent growths of the power generate renewable energy sources.</p> <p>CO2: Understand the basic physics of wind and solar power generation.</p> <p>CO3: Understand the power electronic interfaces for wind and solar generation.</p> <p>CO4: Understand the issues related to the grid-integration of solar and wind energy systems</p>

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EE601PC	Signals and Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Differentiate various signal functions.</p> <p>CO2: Represent any arbitrary signal in time and frequency domain.</p> <p>CO3: Understand the characteristics of linear time invariant systems.</p> <p>CO4: Analyze the signals with different transform technique</p>
EE602PC	Microprocessors & Microcontrollers	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands the internal architecture, organization and assembly language programming of 8086 processors.</p> <p>CO2: Understands the internal architecture, organization and assembly language programming of 8051/controllers</p> <p>CO3: Understands the interfacing techniques to 8086 and 8051 based systems.</p> <p>CO4: Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors.</p>
EE603PC	Power System Protection	<p>At the end of this course, each student should be able to:</p> <p>CO1: Compare and contrast electromagnetic, static and microprocessor-based relays</p> <p>CO2: Apply technology to protect power system components.</p> <p>CO3: Select relay settings of over current and distance relays.</p> <p>CO4: Analyze quenching mechanisms used in air, oil and vacuum circuit breakers</p>
EE604PC	Power System Operation and Control	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand operation and control of power systems.</p> <p>CO2: Analyze various functions of Energy Management System (EMS) functions.</p> <p>CO3: Analyze whether the machine is in stable or</p>

		unstable position. CO4: Understand power system deregulation and restructuring
EE605PC	Power System Lab	At the end of this course, each student should be able to: CO1: Perform various load flow techniques CO2: Understand Different protection methods CO3: Analyze the experimental data and draw the conclusions.
EE606PC	Microprocessors & Microcontrollers Lab	At the end of this course, each student should be able to: CO1: Demonstrate ability to handle arithmetic operations using assembly language programming in TASM and training boards CO2: Demonstrate ability to handle logical operations using assembly language programming in TASM CO3: Demonstrate ability to handle string instructions using assembly language programming in TASM CO4: Demonstrate ability to handle sorting operations and using assembly language programming in TASM
EE607PC	Signals and Systems Lab	At the end of this course, each student should be able to: CO1: Understand the concepts of continuous time and discrete time systems. CO2: Analyse systems in complex frequency domain. CO3: Understand sampling theorem and its implications.
*MC609	Environmental Science	At the end of this course, each student should be able to: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

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B.Tech. IV Year I Sem R16 Regulation Electrical and Electronics Engineering

Course Code	Course Title / Name	Course Outcomes
EE701PC	Power Semiconductor Drives	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the drawbacks of speed control of motor by conventional methods.</p> <p>CO2: Differentiate Phase controlled and chopper controlled DC drives speed-torque.</p> <p>CO3: Characteristics merits and demerits.</p> <p>CO4: Understand Ac motor drive speed-torque characteristics using different control strategies its merits and demerits.</p> <p>CO5: Describe Slip power recovery schemes.</p>
EE702PC	Power System Operation and control	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze the optimal scheduling of power plants.</p> <p>CO2: Analyze the steady state behavior of the power system for voltage and frequency.</p> <p>CO3: Fluctuations.</p> <p>CO4: Describe reactive power control of a power system.</p> <p>CO5: Design suitable controller to dampen the frequency and voltage steady state oscillations.</p>
EE721PE	Professional Elective– II Digital Signal Processing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Perform time, frequency, and Z -transform analysis on signals and systems.</p> <p>CO2: Understand the inter-relationship between DFT and various transforms.</p> <p>CO3: Understand the significance of various filter structures and effects of round off errors.</p> <p>CO4: Design a digital filter for a given specification.</p> <p>CO5: Understand the fast computation of DFT and appreciate the FFT processing.</p> <p>CO6: Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.</p>


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EE722PE	Professional Elective– II HVDC Transmission	<p>At the end of this course, each student should be able to:</p> <p>CO1: Compare EHV AC and HVDC system and to describe various types of DC links.</p> <p>CO2: Analyze Graetz circuit for rectifier and inverter mode of operation .</p> <p>CO3: Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems .</p> <p>CO4: Describe various protection methods for HVDC systems and classify Harmonics and design different types of filters.</p>
EE723PE	Professional Elective– II Switch Mode Power Supplies	<p>At the end of this course, each student should be able to:</p> <p>After completion of this course the students are able to understand the concepts and principle of operation of various types of switched mode power supply systems for both D.C. and A.C. outputs.</p>
EE724PE	Professional Elective– II Reliability Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Model various systems applying reliability Networks.</p> <p>CO2: Evaluate the reliability of simple and complex Systems.</p> <p>CO3: Estimate the limiting state probabilities of repairable systems.</p> <p>CO4: Apply various mathematical models for evaluating reliability of irreparable systems.</p>
EE731PE	Professional Elective-III Digital Control Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Carry map S-plane and Z-plane, do state-space Analysis.</p> <p>CO2: Carry stability analysis in S-domain and Z-Domains.</p> <p>CO3: Carry stability analysis through bilinear transformation and R-H criteria,</p> <p>CO4: Design of discrete-time control systems, design of lag, lead, lead-lag compensators , design of PID controllers and design of state</p>

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		<p>feedback controllers and observers.</p> <p>CO5: Apply the above concepts to real-world electrical and electronics problems and applications.</p>
EE732PE	Professional Elective-III Power Quality	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know the severity of power quality problems in distribution system.</p> <p>CO2: Understand the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage) .</p> <p>CO3: Concept of improving the power quality to sensitive load by various mitigating custom power devices.</p>
EE733PE	Professional Elective-III Modern Power Electronics	<p>At the end of this course, each student should be able to:</p> <p>CO1: To understand various Power Electronics devices such as SCR, TRIAC, DIAC, IGBT, GTO.</p> <p>CO2: To understand application of aforesaid Power Electronics devices in Choppers, Inverters and Converters etc.</p> <p>CO3: To understand control of Electrical Motors through DC-DC converters, AC Converters etc.</p> <p>CO4: To understand the use of Inductors and Capacitors in Choppers, Inverters and Converters.</p>
EE734PE	Professional Elective - III Optimization Techniques	<p>At the end of this course, each student should be able to:</p> <p>CO1: Explain the need of optimization of engineering Systems.</p> <p>CO2: Understand optimization of electrical and electronics engineering problems.</p> <p>CO3: Apply classical optimization techniques, linear programming, simplex algorithm, transportation problem.</p> <p>CO4: Apply unconstrained optimization and constrained non-linear programming and dynamic programming.</p> <p>CO5: Formulate optimization problems.</p>

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EE741PE	Professional Elective-IV Programmable Logic Controllers	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the purpose, functions, and operations of a PLC.</p> <p>CO2: Identify the basic components of the PLC and how they function.</p> <p>CO3: View a directory of processor files using PLC software.</p> <p>CO4: Ability to gain knowledge on Programmable Logic Controllers.</p> <p>CO5: Will understand different types of Devices to which PLC input and output modules are Connected.</p> <p>CO6: To provide the knowledge about understand various types of PLC registers.</p> <p>CO7: Able to create ladder diagrams from process control descriptions.</p> <p>CO8: Ability to apply PLC timers and counters for the control of industrial processes.</p> <p>CO9: Able to use different types PLC functions, Data Handling Function.</p>
EE742PE	Professional Elective-IV EHV AC Transmission Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the basic concepts of EHV AC transmission.</p> <p>CO2: Get the Knowledge on EHV transmission line inductance and capacitance.</p> <p>CO3: Understand the voltage gradients of conductor</p> <p>CO4: Identify corona effects on transmission lines</p> <p>CO5: Calculate electrostatic fields of EHVAC lines and its effects.</p> <p>CO6: Analyze travelling waves</p> <p>CO7: Distinguish various compensators for voltage control.</p>
EE743PE	Professional Elective-IV Flexible A.C. Transmission Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Choose proper controller for the specific application based on system requirements .</p> <p>CO2: Understand various systems thoroughly and</p>



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		<p>their requirements.</p> <p>CO3: Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping .</p> <p>CO4: Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC.</p>
EE744PE	Professional Elective-IV Special Machines	<p>At the end of this course, each student should be able to:</p> <p>CO1: To select different special machines as part of control system components.</p> <p>CO2: To use special machines as transducers for converting physical signals into electrical signals.</p> <p>CO3: To use micro-processors for controlling different machines.</p> <p>CO4: To understand the operation of different special machines.</p>
EE703PC	Electrical Systems Simulation Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design and Analyze electrical systems in time and frequency domain.</p> <p>CO2: Analyze various transmission lines and perform fault analysis.</p> <p>CO3: Model Load frequency control of Power Systems</p> <p>CO4: Design various Power Electronic Converters and Drives.</p>
EE704PC	Electrical Workshop	<p>At the end of this course, each student should be able to:</p> <p>CO1: Get practical knowledge related to electrical.</p> <p>CO2: Fabricate basic electrical circuit elements / networks</p> <p>CO3: Trouble shoot the electrical circuits .</p> <p>CO4: Design filter circuit for application.</p> <p>CO5: Get hardware skills such as soldering, winding etc.</p> <p>CO6: Get debugging skills.</p>

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EE705PC	Industry Oriented Mini Project	<p>At the end of this course, each student should be able to:</p> <p>CO1: Formulate a real world problem and develop its requirements.</p> <p>CO2: Student will be exposed to industrial awareness.</p> <p>CO3: Self learning technologies, methods and/or techniques that contribute to the software solution of the project.</p>
EE706PC	Seminar	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to work in actual working environment.</p> <p>CO2: Ability to utilize technical resources</p> <p>CO3: Ability to write technical documents and give oral presentations related to the work completed.</p>

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Course Code	Course Title / Name	Course Outcomes
	Open Elective – III	
EE851PE	Professional Elective–V Artificial Neural Networks and Fuzzy Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: To understand artificial neural network models and their training algorithms.</p> <p>CO2: To understand the concept of fuzzy logic system components, fuzzification and defuzzification.</p> <p>CO3: Apply the above concepts to real-world problems and applications.</p>
EE852PE	Professional Elective–V Electrical Distribution Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Distinguish between transmission, and distribution line and design the feeders.</p> <p>CO2: Power loss and voltage drop of the feeders.</p> <p>CO3: Design protection of distribution systems.</p> <p>CO4: Understand the importance of voltage control and power factor improvement.</p>


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EE853PE	Professional Elective–V Wind, Solar and Hybrid Energy Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the energy scenario and the consequent growths of the power generate renewable energy sources.</p> <p>CO2: Understand the basic physics of wind and solar power generation.</p> <p>CO3: Understand the power electronic interfaces for wind and solar generation.</p> <p>CO4: Understand the issues related to the grid-integration of solar and wind energy systems.</p>
EE854PE	Professional Elective–V High Voltage Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Acquire knowledge on, basics of high voltage engineering</p> <p>CO2: Understand break-down phenomenon in different types of dielectrics.</p> <p>CO3: Understand generation and measurement of high voltages and currents.</p> <p>CO4: Understand the phenomenon of over- voltages, concept of insulation co-ordination.</p> <p>CO5: Know testing of various materials and electrical apparatus used in high voltage engineering.</p>


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EE861PE	Professional Elective–VI VLSI Design	<p>At the end of this course, each student should be able to:</p> <p>CO1: Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.</p> <p>CO2: Choose an appropriate inverter depending on specifications required for a circuit.</p> <p>CO3: Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit.</p> <p>CO4: Design different types of logic gates using CMOS inverter and analyze their transfer characteristics.</p> <p>CO5: Provide design concepts required to design building blocks of data path using gates.</p> <p>CO6: Design simple memories using MOS transistors and can understand design of large memories.</p> <p>CO7: Design simple logic circuit using PLA, PAL, FPGA and CPLD.</p> <p>CO8: Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system</p>
EE862PE	Professional Elective–VI Smart Electric Grid	<p>At the end of this course, each student should be able to:</p> <p>CO1: Recite the structure of an electricity market in either regulated or deregulated market conditions.</p> <p>CO2: Understand the advantages of DC distribution</p>

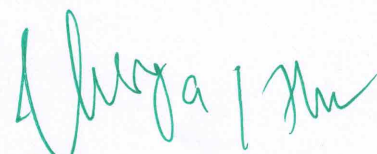
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		<p>and developing technologies in distribution</p> <p>CO3: Discriminate the trade-off between economics and reliability of an electric powersystem, differentiate various investment options (e.g. generation capacities, transmission, renewable, demand-side resources, etc) in electricity markets</p> <p>CO4: Analyze the development of smart and intelligent domestic systems</p>
EE863PE	Professional Elective–VI Utilization of Electric Power	<p>At the end of this course, each student should be able to:</p> <p>CO1: Acquire knowledge on, electric drives characteristics and their applicability in industry based on the nature of different types of loads and their characteristics</p> <p>CO2: Understands the concepts and methods of electric heating, welding, illumination and electric traction</p> <p>CO3: Apply the above concepts to real-world electrical and electronics problems and applications.</p>
EE864PE	Professional Elective–VI Electric and Hybrid Vehicles	<p>At the end of this course, each student should be able to:</p> <p>CO1: Recite the structure of an electricity market in either regulated or deregulated market conditions.</p> <p>CO2: Understand the advantages of DC distribution and developing technologies in distribution.</p> <p>CO3: Discriminate the trade-off between economics and reliability of an electric powersystem, differentiate various investment options (e.g. generation capacities, transmission, renewable, demand-side resources, etc) in electricity markets.</p> <p>CO4: Analyze the development of smart and intelligent domestic systems.</p>
EE801PC	Major Project	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to implement and execute well defined</p>
		<p>Objective.</p> <p>CO2: Ability to work in team at component level and system level.</p> <p>CO3: Ability to troubleshoot.</p>

Open Elective –I
(Common for EEE, ECE, CSE, IT, ME)

Course Code	Course Title / Name	Course Outcomes
CE600OE	Open Elective –I Disaster Preparedness & Planning Management	At the end of this course, each student should be able to: CO1: The application of Disaster Concepts to Management CO2: Analyzing Relationship between Development and Disasters. CO3: Ability to understand Categories of Disasters CO4: Realization of the responsibilities to society
CS600OE	Open Elective –I Entrepreneurship	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.
CS601OE	Open Elective –I Fundamentals of Management for Engineers	At the end of this course, each student should be able to: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.
CS602OE	Open Elective –I Cyber Law & Ethics	At the end of this course, each student should be able to: CO1: The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. CO2: The students will learn the rights and responsibilities as an employee, team member and a global citizen
EC600OE	Open Elective –I Fundamentals of Internet	At the end of this course, each student should be able to:



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	of Things	CO1: Known basic protocols in sensor networks. CO2: Program and configure Arduino boards for various designs. CO3: Python programming and interfacing for Raspberry Pi. CO4: Design IoT applications in different domains
EI600OE	Open Elective –I Basics Of Sensors Technology	At the end of this course, each student should be able to: CO1: Identify suitable sensors and transducers for real time applications. CO2: Translate theoretical concepts into working models. CO3: Design the experimental applications to engineering modules and practices. CO4: Design engineering solution to the Industry/Society needs and develop products.
EE600OE	Open Elective –I Reliability Engineering	At the end of this course, each student should be able to: CO1: Model various systems applying reliability networks CO2: Evaluate the reliability of simple and complex systems CO3: Estimate the limiting state probabilities of repairable systems CO4: Apply various mathematical models for evaluating reliability of irreparable systems
EE601OE	Open Elective –I Renewable Energy Sources	At the end of this course, each student should be able to: CO1: Understand the principles of wind power and solar photovoltaic power generation, fuel cells. CO2: Assess the cost of generation for conventional and renewable energy plants CO3: Design suitable power controller for wind and solar applications CO4: Analyze the issues involved in the integration of renewable energy sources to the grid
ME600OE	Open Elective –I Quantitative Analysis for Business Decisions	At the end of this course, each student should be able to: CO1: Familiar with issues that would crop up in

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		<p>business</p> <p>CO2: Able to formulate Mathematical Model to resolve the issue</p> <p>CO3: Able to select technique for solving the formulated Mathematical Model</p> <p>CO4: Able to analyze the results obtained through the selected technique for implementation.</p>
MT600OE	Open Elective –I Industrial Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Choose, prepare, interpret and use cost estimates as a basis for the different situations in an industrial company.</p> <p>CO2: Interpret financial statements and other financial reports of industrial companies, including the income statement, the balance sheet, the cash flow statement and key measures.</p> <p>CO3: Explain how strategic planning, management, management control, entrepreneurship, organization, production and learning works in an industrial company.</p> <p>CO4: Explain how the industrial company markets and price its products.</p> <p>CO5: Explain how the company deals with its environment.</p>
MT601OE	Open Elective –I Non-Conventional Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells.</p> <p>CO2: Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation.</p> <p>CO3: Explore the concepts involved in wind energy conversion system by studying its components, types and performance.</p> <p>CO4: Illustrate ocean energy and explain the operational methods of their utilization.</p>

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		CO5: Acquire the knowledge on Geothermal energy.
PE600OE	Open Elective –I General Geology	<p>At the end of this course, each student should be able to:</p> <p>The student would understand the basics of geology, viz: formation of earth, layers of earth, different types of rocks, formation of sedimentary basins and the micro fossils and their relationship to oil and gas.</p>
MM600OE	Open Elective –I Testing of Materials	<p>At the end of this course, each student should be able to:</p> <p>CO1: Classify mechanical testing of ferrous and non-ferrous metals and alloys.</p> <p>CO2: Recognize the importance of crystal defects including dislocations in plastic deformation.</p> <p>CO3: Identify the testing methods for obtaining strength and hardness.</p> <p>CO4: Examine the mechanisms of materials failure through fatigue and creep</p>
MM601OE	Open Elective –I Alloy Steels	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to understand different types of alloys used in alloy steels.</p> <p>CO2: Ability to solve different metallurgical problems in alloy steels.</p> <p>CO3: It has a lot of scope in R&D and in automobile engineering.</p>
MN600OE	Open Elective –I Introduction to Mining Technology	<p>At the end of this course, each student should be able to:</p> <p>Upon completion of the course, the student shall be able to understand various stages in the life of the mine, drilling, blasting and shaft sinking.</p>
MN601OE	Open Elective –I Coal Gasification, CBM & Shale Gas	<p>At the end of this course, each student should be able to:</p> <p>Student can get specialized in the underground coal gasification concepts, application and future scope in various geominning conditions.</p>



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Open Elective –III
(Common for EEE, ECE, CSE, IT, ME)

Course Code	Course Title / Name	Course Outcomes
AE831OE	Open Elective – III Air Transportation Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Explain the air transport systems.</p> <p>CO2: Describe the aircraft characteristics, airlines and airport operation.</p> <p>CO3: Apply the Air Navigation System & Environmental Systems.</p>
AE832OE	Open Elective – III Rockets and Missiles	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design a preliminary chemical rocket engine</p> <p>CO2: Compute various types of aerodynamic forces acting on the rocket and missile during the flight.</p> <p>CO3: Determine the various equations of motion used in rocket and missile technology</p> <p>CO4: Illustrate staging of rockets and its performance estimation.</p> <p>CO5: Judge the materials for rocket and missile components.</p>
AM831OE	Open Elective – III Introduction to Mechatronics	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to, Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product. Develop PLC programs for a given task. Evaluate the performance of mechatronic systems.</p>
AM832OE	Open Elective – III Microprocessors and Microcontrollers	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands the internal architecture and organization of 8086, 8051 and ARM processors / controllers.</p>


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		CO2: Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor / micro controller based systems.
BM831OE	Open Elective – III Telemetry and Telecontrol	At the end of this course, each student should be able to: Upon completion of this course students will appreciate the application of different telemetry systems and control to any process.
BM832OE	Open Elective – III Electromagnetic Interference and Compatibility	At the end of this course, each student should be able to: CO1: Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems. CO2: Analyze various sources of EMI and various possibilities to provide EMC. CO3: Understand and analyze possible EMI prevention techniques such as grounding, shielding, filtering, and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.
CE831OE	Open Elective – III Environmental Impact Assessment	At the end of this course, each student should be able to: CO1: Identify the environmental attributes to be considered for the EIA study. CO2: Formulate objectives of the EIA studies. CO3: Identify the suitable methodology and prepare Rapid EIA. CO4: Identify and incorporate mitigation measures.
CE832OE	Open Elective – III Optimization Techniques in Engineering	At the end of this course, each student should be able to: CO1: Formulate optimization problem. CO2: Solve the problem by using appropriate optimization techniques.
CE833OE	Open Elective – III Entrepreneurship and Small Business Enterprises	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development


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		which will help them to provide vision for their own Start-up.
CN831OE	Open Elective – III Remote Sensing and GIS	<p>At the end of this course, each student should be able to:</p> <p>CO1: Retrieve the information content of remotely sensed data.</p> <p>CO2: Analyze the energy interactions in the atmosphere and earth surface features.</p> <p>CO3: Interpret the images for preparation of thematic maps.</p> <p>CO4: Apply problem specific remote sensing data for engineering applications.</p> <p>CO5: Analyze spatial and attribute data for solving spatial problems.</p> <p>CO6: Create GIS and cartographic outputs for presentation.</p>
CS831OE	Open Elective – III Linux Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Work confidently in Linux environment.</p> <p>CO2: Work with shell script to automate different tasks as Linux administration.</p>
CS832OE	Open Elective – III R Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to use and program in the Programming language R.</p> <p>CO2: Be able to use R to solve statistical problems.</p> <p>CO3: Be able to implement and describe Monte Carlo the technology.</p> <p>CO4: Be able to minimize and maximize functions using R.</p>
CS833OE	Open Elective – III PHP Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to develop a form containing several fields and be able to process the data provided on the form by a user in a PHP- based script.</p> <p>CO2: Understand basic PHP syntax for variable use and standard language constructs, such as conditionals and loops.</p>


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		<p>CO3: Understand the syntax and use of PHP object-oriented classes.</p> <p>CO4: Understand the syntax and functions available to deal with file processing for files on the server as well as processing web URLs.</p> <p>CO5: Understand the paradigm for dealing with form-based data, both from the syntax of HTML forms, and how they are accessed inside a PHP-based script.</p>
EC831OE	Open Elective – III Electronic Measuring Instruments	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.</p> <p>CO2: Measure various physical parameters by appropriately selecting the transducers.</p> <p>CO3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.</p>
EM831OE	Open Elective – III Data Analytics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the impact of data analytics for business decisions and strategy.</p> <p>CO2: Carry out data analysis/statistical analysis</p> <p>CO3: To carry out standard data visualization and formal inference procedures.</p> <p>CO4: Design Data Architecture</p> <p>CO5: Understand various Data Sources.</p>
EE831OE	Open Elective – III Entrepreneur Resource Planning	<p>At the end of this course, each student should be able to:</p> <p>ERP System Implementation options, and functional modules of ERP.</p> <p>CO1: Introduction to ERP- Foundation for Understanding ERP systems-Business benefits of ERP-The challenges of implementing ERP system-ERP modules and Historical Development.</p> <p>Case: Response to RFP for an ERP system (Mary Sumner).</p>


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		<p>CO2: ERP system options & Selection methods- Measurement of project Impact- information Technology Selection-ERP proposal evaluation-Project Evaluation Technique. Case: Atlantic Manufacturing (Mary Sumner).</p> <p>CO3: ERP system Installation Options- IS/IT Management results-Risk Identification analysis-System Projects- Demonstration of the system-Failure method-system Architecture & ERP (David L. Olson) Case: Data Solutions & Technology Knowledge (Mary Sumner).</p> <p>CO4: ERP - sales and Marketing- Management control process in sales and marketing – ERP customer relationship management - ERP systems- Accounting & Finance control processes. Financial modules in ERP systems. Case: Atlantic manufacturing (Mary Sumner).</p> <p>CO5: ERP – Production and Material Management- Control process on production and manufacturing - Production module in ERP- supply chain Management & e-market place-e-business & ERP-e supply chain & ERP- Future directions for ERP. Case: HR in Atlantic manufacturing. (Mary Sumner).</p>
EE832OE	<p>Open Elective – III Management Information Systems</p>	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the usage of MIS in organizations and the constituents of the MIS.</p> <p>CO2: Understand the classifications of MIS, understanding of functional MIS and the different functionalities of these MIS. This would be followed by case study on Knowledge management.</p> <p>CO3: Assess the requirement and stage in which the organization is placed. Nolan model is expected to aid such decisions.</p> <p>CO4: Learn the functions and issues at each stage</p>


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		of system development. Further different ways in which systems can be developed are also learnt.
EE833OE	Open Elective – III Organizational Behaviour	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyse the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behaviour.</p> <p>CO2: Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behaviour.</p> <p>CO3: Critically evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behaviour.</p> <p>CO4: Analyse organizational behavioural issues in the context of organizational behaviour theories, models and concepts.</p>
EI831OE	Open Elective – III Sensors and Transducers,	<p>At the end of this course, each student should be able to:</p> <p>Upon completion of this course the student shall be able to understand the working of basic sensors and transducers used in any industries.</p>
EI832OE	Open Elective – III PC Based Instrumentation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands measurement and analyzing techniques of digital computer power and performance .</p> <p>CO2: Understands the various types of interfacing systems and components.</p> <p>CO3: Develops the knowledge of real-time systems and case studies in instrumentation .</p> <p>CO4: Capability to analyze PC based data .</p> <p>CO5: Capable to develop instrumentation systems on various processes of industrial measurements.</p>
ME831OE	Open Elective – III Total Quality Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Evaluate the principles of quality</p>



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		<p>management and to explain how these principles can be applied within quality management systems.</p> <p>CO2: Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.</p> <p>CO3: Critically appraise the organisational, communication and teamwork requirements for effective quality management .</p> <p>CO4: Critically analyse the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans.</p>
ME832OE	Open Elective – III Industrial Safety, Health, and Environmental Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: To list out important legislations related to Health , Safety and Environment</p> <p>CO2: To list out requirements mentioned in factories act for the prevention of accidents. To understand the health and welfare provisions given in factories act.</p> <p>CO3: To understand the statutory requirements for an Industry on registration, license and its renewal.</p> <p>CO4: To prepare onsite and offsite emergency plan.</p>
ME833OE	Open Elective – III Basics of Thermodynamics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand and differentiate between different thermodynamic systems and processes.</p> <p>CO2: Understand and apply the laws of Thermodynamics to different types of system undergoing various processes.</p> <p>CO3: Understand and analyze the Thermodynamic Cycles.</p>
ME834OE	Open Elective – III Reliability Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Model various systems applying reliability networks.</p>



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		<p>CO2: Evaluate the reliability of simple and complex systems.</p> <p>CO3: Estimate the limiting state probabilities of repairable systems.</p> <p>CO4: Apply various mathematical models for evaluating reliability of irreparable systems.</p>
NT831OE	Open Elective – III Concepts of Nano Science And Technology	<p>At the end of this course, each student should be able to:</p> <p>The intended course covers the whole spectrum of nanomaterials ranging from introduction, classification, synthesis, properties, and characterization tools of nanophase materials to application including some new developments in various aspects.</p>
NT832OE	Open Elective – III Synthesis of Nanomaterials	<p>At the end of this course, each student should be able to:</p> <p>To provide abundant knowledge on various synthesis methods of nanomaterials.</p>
NT833OE	Open Elective – III Characterization of Nanomaterials	<p>At the end of this course, each student should be able to:</p> <p>CO1: The student will develop a fundamental knowledge of nanomaterials. .</p> <p>CO2: The student will demonstrate an understanding of the properties of materials with strong dependence on size.</p> <p>CO3: The student will demonstrate an understanding of approaches to nanomaterials characterization.</p>
MT831OE	Open Elective – III Renewable Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding of renewable energy sources.</p> <p>CO2: Knowledge of working principle of various energy systems.</p> <p>CO3: Capability to carry out basic design of renewable energy systems.</p>
MT832OE	Open Elective – III Production Planning and Control	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to,</p>

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		Understand production systems and their characteristics. Evaluate MRP and JIT systems against traditional inventory control systems. Understand basics of variability and its role in the performance of a production system. Analyze aggregate planning strategies. Apply forecasting and scheduling techniques to production systems. Understand theory of constraints for effective management of production systems.
MT833OE	Open Elective – III Entrepreneurship and Small Business Enterprises	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.
MM831OE	Open Elective – III Design and Selection of Engineering Materials	At the end of this course, each student should be able to: Understand the Relationship between materials selection, processing and applications.
MN831OE	Open Elective – III Solid Fuel Technology	At the end of this course, each student should be able to: Students can understand the fundamentals of Processes of formation of coal, properties and evaluation and coal preparation and washability characteristics of coal.
MN832OE	Open Elective – III Health & Safety in Mines	At the end of this course, each student should be able to: CO1: Gain insights of safety management system and risk management in Indian mining industries. CO2: Formulate safety audits and control in mining industries. CO3: Produce risk analysis using statistical methods and analysis of mine accidents.



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PE831OE	Open Elective – III Disaster Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding Disasters, man-made Hazards and Vulnerabilities.</p> <p>CO2: Understanding disaster management mechanism.</p> <p>CO3: Understanding capacity building concepts and planning of disaster managements.</p>
PE832OE	Open Elective – III Fundamentals of Liquefied Natural Gas	<p>At the end of this course, each student should be able to:</p> <p>CO1: Have good knowledge on LNG process.</p> <p>CO2: Classify different liquefaction techniques.</p> <p>CO3: Understand different units in LNG processing and transportation.</p> <p>CO4: Have knowledge associated with safety aspects of LNG.</p>
PE833OE	Open Elective – III Health, Safety and Environment in Petroleum Industry	<p>At the end of this course, each student should be able to:</p> <p>CO1: The student can have the knowledge of various Acts related to safety, Health and environment in petroleum industry.</p> <p>CO2: The student can have the knowledge of various drilling fluids handling and safe disposal such toxic products.</p> <p>CO3: Knowledge of disaster management to fight any crisis.</p> <p>CO4: Knowledge of Hazard studies and occupational health hazards in the industry.</p>

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VAAGESWARI COLLEGE OF ENGINEERING

Beside LMD Police Station, Ramakrishna Colony,
KARIMNAGAR, Telangana state – 505 527
Affiliated to Jawaharlal Nehru Technological University Hyderabad,
Approved by AICTE New Delhi

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE OUTCOMES (COs)

B.Tech. II Year I Sem R18 Regulations Mechanical Engineering

Course Code	Course Title / Name	Course Outcomes
MA301BS	Probability and Statistics & Complex Variables	<p>At the end of this course, each student should be able to:</p> <p>CO1: Formulate and solve problems involving random variables and apply statistical methods for analysing experimental data.</p> <p>CO2: Analyse the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.</p> <p>CO3: Taylor's and Laurent's series expansions of complex function.</p>
ME302PC	Mechanics of Solids	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze the behavior of the solid bodies subjected to various types of loading;</p> <p>CO2: Apply knowledge of materials and structural elements to the analysis of simple structures;</p> <p>CO3: Undertake problem identification, formulation and solution using a range of analytical methods;</p> <p>CO4: Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.</p> <p>CO5: Expectation and capacity to undertake lifelong learning</p>

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ME303PC	Material Science and Metallurgy	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze the Structure of materials at different levels, basic concepts of crystalline materials like unit cell, FCC, BCC, HCP, APF (Atomic Packing Factor), Co-ordination Number etc.</p> <p>CO2: Understand concept of mechanical behavior of materials and calculations of same using appropriate equations.</p> <p>CO3: Explain the concept of phase & phase diagram & understand the basic terminologies associated with metallurgy. Construction and identification of phase diagrams and reactions</p> <p>CO4: Understand and suggest the heat treatment process & types. Significance of properties Vs microstructure. Surface hardening & its types. Introduce the concept of hardenability & demonstrate the test used to find hardenability of steels</p> <p>CO5: Explain features, classification, applications of newer class materials like smart materials, piezoelectric materials, biomaterials, composite materials etc</p>
ME304PC	Production Technology	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the idea for selecting materials for patterns.</p> <p>CO2: Know Types and allowances of patterns used in casting and analyze the components of moulds.</p> <p>CO3: Design core, core print and gating system in metal casting processes</p> <p>CO4: Understand the arc, gas, solid state and resistance welding processes.</p> <p>CO5: Develop process-maps for metal forming processes using plasticity principles.</p> <p>CO6: Identify the effect of process variables to manufacture defect free products.</p>

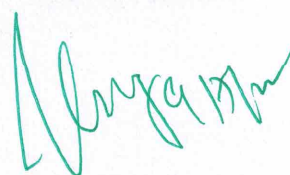
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ME305PC	Thermodynamics	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student should be able to Understand and differentiate between different thermodynamic systems and processes. Understand and apply the laws of Thermodynamics to different types of systems undergoing various processes and to perform thermodynamic analysis. Understand and analyze the Thermodynamic cycles and evaluate performance parameters.</p>
ME306PC	Production Technology Lab	<p>At the end of this course, each student should be able to:</p> <p>Understanding the properties of moulding sands and pattern making. Fabricate joints using gas welding and arc welding. Evaluate the quality of welded joints. Basic idea of press working tools and performs moulding studies on plastics.</p>
ME307PC	Machine Drawing Practice	<p>At the end of this course, each student should be able to:</p> <p>CO1: Preparation of engineering and working drawings with dimensions and bill of material during design and development. Developing assembly drawings using part drawings of machine components.</p> <p>CO2: Conventional representation of materials, common machine elements and parts such as screws, nuts, bolts, keys, gears, webs, ribs.</p> <p>CO3: Types of sections – selection of section planes and drawing of sections and auxiliary sectional views. Parts not usually sectioned.</p> <p>CO4: Methods of dimensioning, general rules for sizes and placement of dimensions for holes, centers, curved and tapered features.</p> <p>CO5: Title boxes, their size, location and details - common abbreviations and their liberal usage</p> <p>CO6: Types of Drawings – working drawings for machine parts.</p>

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ME308PC	Material Science and Mechanics of Solids Lab	<p>At the end of this course, each student should be able to:</p> <p>The Primary focus of the Metallurgy and Material science program is to provide undergraduates with a fundamental knowledge based associated materials properties, and their selection and application. Upon graduation, students would have acquired and developed the necessary background and skills for successful careers in the materials-related industries. Furthermore, after completing the program, the student should be well prepared for management positions in industry or continued education toward a graduate degree.</p>
*MC309	Constitution of India	<p>At the end of this course, each student should be able to:</p> <p>CO1 : Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration.</p> <p>CO2: Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.</p> <p>CO3: Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.</p> <p>CO4: Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.</p>



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B.Tech. II Year II Sem R18 Regulation Mechanical Engineering

Course Code	Course Title / Name	Course Outcomes
EE401ES	Basic Electrical and Electronics Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: To analyze and solve electrical circuits using network laws and theorems.</p> <p>CO2: To understand and analyze basic Electric and Magnetic circuits</p> <p>CO3: To study the working principles of Electrical Machines</p> <p>CO4: To introduce components of Low Voltage Electrical Installations</p> <p>CO5: To identify and characterize diodes and various types of transistors.</p>
ME402PC	Kinematics of Machinery	<p>At the end of this course, each student should be able to:</p> <p>The main purpose is to give an idea about the relative motions obtained in all the above type of components used in mechanical Engineering.</p>
ME403PC	Thermal Engineering - I	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student should be able to evaluate the performance of IC engines and compressors under the given operating conditions. Apply the laws of Thermodynamics to evaluate the performance of Refrigeration and air-conditioning cycles. Understand the functionality of the major components of the IC Engines and effects of operating conditions on their performance</p>
ME404PC	Fluid Mechanics and Hydraulic Machines	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to explain the effect of fluid properties on a flow system.</p> <p>CO2: Able to identify type of fluid flow patterns and describe continuity equation.</p> <p>CO3: To analyze a variety of practical fluid flow and measuring devices and utilize Fluid Mechanics principles in design.</p>

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		<p>CO4: To select and analyze an appropriate turbinewith reference to given situation in power plants.</p> <p>CO5: To estimate performance parameters of a given Centrifugal and Reciprocating pump.</p> <p>CO6: Able to demonstrate boundary layer concepts.</p>
ME405PC	Instrumentation and Control Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: To identify various elements and their purpose in typical instruments, to identify various errors that would occur in instruments.</p> <p>CO2: Analysis of errors so as to determine correction factors for each instrument.</p> <p>CO3: To understand static and dynamic characteristics of instrument and should be able to determine loading response time.</p> <p>CO4: For given range of displacement should be able to specify transducer, its accurate and loading time of that transducer.</p>
ME406PC	Basic Electrical and Electronics Engineering Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: To analyze and solve electrical circuits using network laws and theorems.</p> <p>CO2: To understand and analyze basic Electric and Magnetic circuits</p> <p>CO3: To study the working principles of Electrical Machines</p> <p>CO4: To introduce components of Low Voltage Electrical Installations</p> <p>CO5: To identify and characterize diodes and various types of transistors.</p>
ME407PC	Fluid Mechanics and Hydraulic Machines Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to explain the effect of fluid properties on a flow system.</p> <p>CO2: Able to identify type of fluid flow patterns and describe continuity equation.</p> <p>CO3: To analyze a variety of practical fluid flow and measuring devices and utilize fluid mechanics</p>

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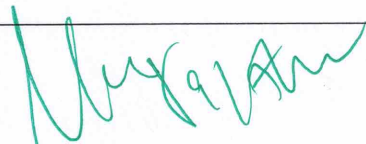
		<p>principles in design.</p> <p>CO4: To select and analyze an appropriate turbine with reference to given situation in power plants.</p> <p>CO5: To estimate performance parameters of a given Centrifugal and Reciprocating pump.</p> <p>CO6: Able to demonstrate boundary layer concepts</p>
ME408PC	Instrumentation and Control Systems Lab	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to Characterize and calibrate measuring devices. Identify and analyze errors in measurement. Analyze measured data using regression analysis. Calibration of Pressure Gauges, temperature, LVDT, capacitive transducer, rotameter.</p>
*MC409	Gender Sensitization Lab	<p>At the end of this course, each student should be able to:</p> <p>At the end of this course, each student should be able to:</p> <p>CO1: Students will have developed a better understanding of important issues related to gender in contemporary India.</p> <p>CO2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.</p> <p>CO3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.</p> <p>CO4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.</p> <p>CO5: Men and women students and professionals will be better equipped to work and live together as equals.</p> <p>CO6: Students will develop a sense of appreciation of women in all walks of life.</p>


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		CO7: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence
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B.Tech. III Year I Sem R18 Regulation Mechanical Engineering

Course Code	Course Title / Name	Course Outcomes
ME501PC	Dynamics of Machinery	<p>At the end of this course, each student should be able to:</p> <p>The study of KOM & DOM are necessary to have an idea while designing the various machine members like shafts, bearings, gears, belts & chains and various I.C. Engine Components & Machine tool parts.</p>
ME502PC	Design of Machine Members-I	<p>At the end of this course, each student should be able to:</p> <p>CO1: The student acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure.</p> <p>CO2: Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading.</p> <p>CO3: Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element.</p>
ME503PC	Metrology & Machine Tools	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify techniques to minimize the errors in measurement.</p> <p>CO2: Identify methods and devices for measurement of length, angle, gear & thread parameters, surface roughness and geometric features of parts.</p> <p>CO3: Understand working of lathe, shaper, planer, drilling, milling and grinding machines.</p> <p>CO4: Comprehend speed and feed mechanisms of machine tools.</p> <p>CO5: Estimate machining times for machining operations on machine tools</p>


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SM504MS	Business Economics & Financial Analysis	<p>At the end of this course, each student should be able to:</p> <p>The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.</p>
ME505PC	Thermal Engineering-II	<p>At the end of this course, each student should be able to:</p> <p>CO1: Develop state – space diagrams based on the schematic diagrams of process flow of steam and gas turbine plants</p> <p>CO2: Apply the laws of Thermodynamics to analyze thermodynamic cycles</p> <p>CO3: Differentiate between vapour power cycles and gas power cycles</p> <p>CO4: Infer from property charts and tables and to apply the data for the evaluation of performance parameters of the steam and gasturbine plants</p> <p>CO5: Understand the functionality of major components of steam and gas turbine plants and to do the analysis of these components</p>
ME506PC	Operations Research	<p>At the end of this course, each student should be able to:</p> <p>Understanding the problem, identifying variables & constants, Formulation of optimization model and applying appropriate optimization technique</p>
ME507PC	Thermal Engineering Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Appreciate the practical ways to find calorific values of fuel.</p> <p>CO2: Understand the various components and mechanisms of I. C. Engines. Appreciate the Mechanism of ports /Valves functioning in 2-stroke petrol /Diesel engine.</p> <p>CO3: Evaluating the performance characteristics of single cylinder petrol engine at different loads and single cylinder diesel engine at different loads and draw the heat balance sheet.</p> <p>CO4: Understand the method of finding the indicated power of individual cylinders of an engine by</p>

		<p>using morse test.</p> <p>CO5: Understand the method of evaluating the co efficient of performance of refrigerator.</p> <p>CO6: Understand the method of finding the thermal conductivity of material.</p>
ME508PC	Metrology & Machine Tools Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Perform plain turning, step turning and Grooving on a circular rod</p> <p>CO2: Perform the step turning and taper turning on a circular rod</p> <p>CO3: Perform thread cutting and knurling on a circular C.S rod and using the lathe machine</p> <p>CO4: Drill a hole and perform tapping once given work piece.</p> <p>CO5: Slotting operation on a given specimen</p> <p>CO6: Surface finish of given work piece</p> <p>CO7: Shaping of square block, V- groove</p> <p>CO8: Measure the length and diameter using vernier calipers</p> <p>CO9: Determine angle of given specimen</p>
ME509PC	Kinematics & Dynamics Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand types of motion</p> <p>CO2: Analyze forces and torques of components in linkages</p> <p>CO3: Understand static and dynamic balance</p> <p>CO4: Understand forward and inverse kinematics of open-loop mechanisms</p>
*MC510	Intellectual Property Rights	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.</p> <p>CO2: Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.</p>

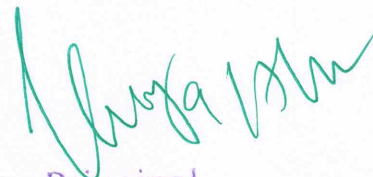
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		<p>CO3: Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.</p> <p>CO4: Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.</p> <p>CO5: Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.</p> <p>CO6: Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;</p>
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B.Tech. III Year II Sem R18 Regulation Mechanical Engineering

Course Code	Course Title / Name	Course Outcomes
ME601PC	Design of Machine Members-II	<p>At the end of this course, each student should be able to:</p> <p>CO1: Knowledge about journal bearing design using different empirical relations.</p> <p>CO2: Estimation of life of rolling element bearings and their selection for given service conditions.</p> <p>CO3: Acquaintance with design of the components as per the standard, recommended procedures which is essential in design and development of machinery in industry.</p>


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ME602PC	Heat Transfer	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the basic modes of heat transfer</p> <p>CO2: Compute one dimensional steady state heat transfer with and without heat generation</p> <p>CO3: Understand and analyze heat transfer through extended surfaces</p> <p>CO4: Understand one dimensional transient conduction heat transfer</p> <p>CO5: Understand concepts of continuity, momentum and energy equations</p> <p>CO6: Interpret and analyze forced and free convective heat transfer</p> <p>CO7: Understand the principles of boiling, condensation and radiation heat transfer</p> <p>CO8: Design of heat exchangers using LMTD and NTU methods</p>
ME603PC	CAD & CAM	<p>At the end of this course, each student should be able to:</p> <p>Understand geometric transformation techniques in CAD. Develop mathematical models to represent curves and surfaces. Model engineering components using solid modeling techniques. Develop programs for CNC to manufacture industrial components. To understand the application of computers in various</p>
		<p>aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.</p>
ME611PE	Professional Elective – I Unconventional Machining Processes	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the basic techniques of Unconventional Machining processes modeling</p> <p>CO1: Estimate the material removal rate and cutting force, in an industrially useful manner, for Unconventional Machining processes.</p>

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ME612PE	Professional Elective – I Machine Tool Design	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to, understand basic motions involved in a machine tool, design machine tool structures, design and analyze systems for specified speeds and feeds, select subsystems for achieving high accuracy in machining, understand control strategies for machine tool operations and apply appropriate quality tests for quality assurance.</p>
ME613PE	Professional Elective – I Production Planning & Control	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to understand production systems and their characteristics. Evaluate MRP and JIT systems against traditional inventory control systems. Understand basics of variability and its role in the performance of a production system. Analyze aggregate planning strategies. Apply forecasting and scheduling techniques to production systems. Understand theory of constraints for effective management of production systems.</p>
	Open Elective - I	
ME604PC	Finite Element Methods	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to, Apply finite element method to solve problems in solid mechanics, fluid mechanics and heat transfer. Formulate and solve problems in one dimensional</p>
		<p>structures including trusses, beams and frames. Formulate FE characteristic equations for two dimensional elements and analyze plain stress, plain strain, axisymmetric and plate bending problems. ANSYS, ABAQUS, NASTRAN, etc.</p>

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ME605PC	Heat Transfer Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Perform steady state conduction experiments to estimate thermal conductivity of different materials</p> <p>CO2: Perform transient heat conduction experiment</p> <p>CO3: Estimate heat transfer coefficients in forced convection, free convection, condensation and correlate with theoretical values</p> <p>CO4: Obtain variation of temperature along the length of the pin fin under forced and free convection</p> <p>CO5: Perform radiation experiments: Determine surface emissivity of a test plate and Stefan-Boltzmann's constant and compare with theoretical value</p>
ME606PC	CAD & CAM Lab	<p>At the end of this course, each student should be able to:</p> <p>To understand the analysis of various aspects in of manufacturing design</p>
EN608HS	Advanced Communication Skills lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: To improve fluency in English through a well developed vocabulary and enable them to listen at normal conversational speed by educated English speakers and respond appropriately in different socio cultural and professional context</p> <p>CO2: Further, they would be required to communicate their ideas relevantly and coherently in writing</p> <p>CO3: To prepare all the students for their placements</p> <p>CO4: Learn to overcome stage fear and make</p>
		<p>presentations with ease</p> <p>CO5: Learn how to pronounce words using the rules they have been taught</p>

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*MC609	Environmental Science	<p>At the end of this course, each student should be able to:</p> <p>Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development</p>
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B.Tech. IV Year I Sem R16 Regulation Mechanical Engineering

Course Code	Course Title / Name	Course Outcomes
ME701PC	CAD/CAM	<p>At the end of this course, each student should be able to:</p> <p>Understand geometric transformation techniques in CAD. Develop mathematical models to represent curves and surfaces .Model engineering components using solid modeling techniques. Develop programs for CNC to manufacture industrial components. To understand the application of computers in various aspects of Manufacturing viz., Design, Proper planning, Manufacturing cost, Layout & Material Handling system.</p>
ME702PC	Instrumentation and Control System	<p>At the end of this course, each student should be able to:</p> <p>To identify various elements and their purpose in typical instruments, to identify various errors that would occur in instruments. Analysis of errors so as to determine correction factors for each an instrument. To understand static and dynamic characteristics of instrument and should be able to determine loading response time. For given range of displacement should be able to specify transducer, its accurate and loading time of that transducer.</p>
ME721PE	Professional Elective – II Composite materials	<p>At the end of this course, each student should be able to:</p> <p>The student will apply the concepts learnt during the course to design, and apply a composite material for a specific application.</p>


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ME722PE	Professional Elective – II Industrial Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Choose, prepare, interpret and use cost estimates as a basis for the different situations in an industrial company.</p> <p>CO2: Interpret financial statements and other financial reports of industrial companies,</p>
		<p>including the income statement, the balance sheet, the cash flow statement and key measures.</p> <p>CO3: Explain how strategic planning, management, management control, entrepreneurship, organization, production and learning works in an industrial company.</p> <p>CO4: Explain how the industrial company markets and price its products.</p> <p>CO5: Explain how the company deals with its environment.</p>
ME723PE	Professional Elective – II Power Plant Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the concept of Rankine cycle.</p> <p>CO2: Understand working of boilers including water tube, fire tube and high pressure boilers and determine efficiencies.</p> <p>CO3: Analyze the flow of steam through nozzles</p> <p>CO4: Evaluate the performance of condensers and steam turbines</p> <p>CO5: Evaluate the performance of gas turbines</p>
ME724PE	Professional Elective – II Operations Research	<p>At the end of this course, each student should be able to:</p> <p>Understanding the problem, identifying variables & constants, formulas of optimization model and applying appropriate optimization Technology.</p>
ME731PE	Professional Elective– III Engineering Tribology	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding friction characteristics in journal bearings.</p> <p>CO2: Knowledge about different theories of lubrication to reduce friction and wear.</p>

ME732PE	Professional Elective– III Computational Fluid Dynamics	<p>At the end of this course, each student should be able to:</p> <p>Outcome 1: Provide the student with a significant level of experience in the use of modern CFD software for the analysis of complex fluid-flow systems.</p>
		<p>1.1 The student will demonstrate the ability to use modern CFD software tools to build flow geometries, generate an adequate mesh for an accurate solution, select appropriate solvers to obtain a flow solution, and visualize the resulting flow field.</p> <p>1.2 The student will demonstrate the ability to analyze a flow field to determine various quantities of interest, such as flow rates, heat fluxes, pressure drops, losses, etc., using flow visualization and analysis tools.</p> <p>Outcome 2: Improve the student's understanding of the basic principles of fluid mechanics.</p> <p>2.1 The student will demonstrate an ability to recognize the type of fluid flow that is occurring in a particular physical system and to use the appropriate model equations to investigate the flow.</p> <p>2.2 The student will demonstrate an ability to describe various flow features in terms of appropriate fluid mechanical principles and force balances.</p> <p>Outcome 3: Improve the student's research and communication skills using a self-directed, detailed study of a complex fluid-flow problem and to communicate the results in written form.</p> <p>3.1 The student will demonstrate the ability to simplify a real fluid-flow system into a simplified model problem, to select the proper governing equations for the physics involved in the system, to solve for the flow, to investigate the fluid-flow behavior, and to understand the results.</p> <p>3.2 The student will demonstrate the ability to communicate the results of this detailed fluid-flow study in a written format.</p>

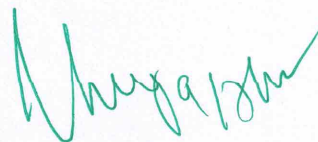
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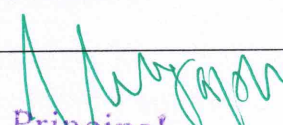
ME733PE	Professional Elective– III Robotics	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to understand the basic components of robots. Differentiate types of robots and robot grippers. Model forward and inverse kinematics of robot</p>
		manipulators. Analyze forces in links and joints of a robot. Programme a robot to perform tasks in industrial applications. Design intelligent robots using sensors.
ME734PE	Professional Elective– III CNC Technology	<p>At the end of this course, each student should be able to:</p> <p>At the end course, one should be able to select tooling method, control mechanism and do part programming for a given product.</p>
ME741PE	Professional Elective– IV Mechanical Vibrations	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to, Understand the causes and effects of vibration in mechanical systems. Develop schematic models for physical systems and formulate governing equations of motion. Understand the role of damping, stiffness and inertia in mechanical systems Analyze rotating and reciprocating systems and compute critical speeds. Analyze and design machine supporting structures, vibration isolators and absorbers.</p>
ME742PE	Professional Elective– IV Turbo Machines	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to design and calculate different parameters for turbo machines</p> <p>CO2: Prerequisite to CFD and Industrial fluid power Courses.</p> <p>CO3: Ability to formulate design criteria</p> <p>CO4: Ability to understand thermodynamics and kinematics behind turbo machines</p>

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ME743PE	Professional Elective– IV MEMS	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students will be able to understand working principles of currently available micro sensors, actuators, and motors, valves, pumps, and fluidics used in Microsystems.</p> <p>CO2: Students will be able to apply scaling laws that are used extensively in the conceptual design of micro devices and systems.</p>
		<p>Students will be able to differentiate between the positive and negative consequences of scaling down certain physical quantities that are pertinent to Microsystems.</p> <p>CO3: Students will be able to use materials for common micro components and devices.</p> <p>CO4: Students will be able to choose a micromachining technique, such as bulk micromachining and surface micromachining for a specific MEMS fabrication process.</p> <p>CO5: Students will be able to understand the basic principles and applications of micro fabrication processes, such as photolithography, ion implantation, diffusion, oxidation, CVD, PVD, and etching.</p> <p>CO6: Students will be able to consider recent advancements in the field of MEMS and devices.</p> <p>CO7: Students will be able to communicate their results and findings orally via formal presentations and in writing through reports.</p>


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ME744PE	Professional Elective–IV Additive Manufacturing Technology	<p>At the end of this course, each student should be able to:</p> <p>CO1: Describe various CAD issues for 3D printing and rapid prototyping and related operations for STL model manipulation.</p> <p>CO2: Formulate and solve typical problems on reverse engineering for surface reconstruction from physical prototype models through digitizing and spline-based surface fitting.</p> <p>CO3: Formulate and solve typical problems on reverse engineering for surface reconstruction from digitized mesh models through topological modelling and subdivision surface fitting.</p>
		<p>CO4: Explain and summarize the principles and key characteristics of additive manufacturing technologies and commonly used 3D printing and additive manufacturing systems.</p> <p>CO5: Explain and summarize typical rapid tooling processes for quick batch production of plastic and metal parts.</p>
ME703PC	CAD/CAM Lab	<p>At the end of this course, each student should be able to:</p> <p>To be able to understand and handle design problems in a systematic manner. To be able to apply CAD in real life applications. To be understand the basic principles of different types of analysis.</p>
ME704PC	Instrumentation and Control Systems Lab	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to Characterize and calibrate measuring devices. Identify and analyze errors in measurement. Analyze measured data using regression analysis. Calibration of Pressure Gauges, temperature, LVDT, capacitive transducer, rotameter.</p>


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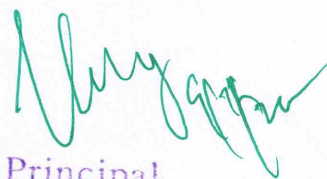
ME705PC	Industry Oriented Mini Project	<p>At the end of this course, each student should be able to:</p> <p>CO1: Formulate a real world problem and develop its Requirements.</p> <p>CO2: Student will be exposed to industrial awareness</p> <p>CO3: Self learning technologies, methods and/or techniques that contribute to the software solution of the project.</p>
ME706PC	Seminar	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to work in actual working environment.</p> <p>CO2: Ability to utilize technical resources</p> <p>CO3: Ability to write technical documents and give oral presentations related to the work completed.</p>

B.Tech. IV Year II Sem R16 Regulation Mechanical Engineering

Course Code	Course Title / Name	Course Outcomes
	Open Elective – III	
ME851PE	Professional Elective – V Automation in Manufacturing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Illustrate the basic concepts of automation in machine tools.</p> <p>CO2: Analyze various automated flow lines, Explain assembly systems and line balancing methods.</p> <p>CO3: Describe the importance of automated material handling and storage systems.</p> <p>CO4: Interpret the importance of adaptive control systems, automated inspection systems.</p>


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ME852PE	Professional Elective – V Fluid Power System	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the Properties of fluids, Fluids for hydraulic systems.</p> <p>CO2: Governing laws. distribution of fluid power, Design and analysis of typical hydraulic circuits.</p> <p>CO3: Know accessories used in fluid power system, Filtration systems and maintenance of system.</p>
ME853PE	Professional Elective – V Renewable Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding of renewable energy sources</p> <p>CO2: Knowledge of working principle of various energy systems.</p> <p>CO3: Capability to carry out basic design of renewable energy systems.</p>
ME854PE	Professional Elective – V Production Planning and Control	<p>At the end of this course, each student should be able to:</p> <p>Understand production systems and their characteristics. Evaluate MRP and JIT systems against traditional inventory control systems.</p> <p>Understand basics of variability and its role in the performance of a production system. Analyze aggregate planning strategies. Apply forecasting and scheduling techniques to production systems. Understand theory of constraints for effective management of production systems.</p>



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ME861PE	Professional Elective–VI Automobile Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Gain the knowledge on automobile and its types and basic knowledge about engine and its Lubrication to the practical problems.</p> <p>CO2: Analyze the Type of cooling and new technology processes of cooling and ignition systems and its trouble shooting of simple problems on fuel, ignition, cooling, lubrication and electrical systems .</p> <p>CO3: Develop an ability to analyze of suspension system and braking systems.</p> <p>CO4: Analyze new technical challenges and design of Power steering systems and new technical advancements in the automotive industry and braking systems.</p> <p>CO5: Gain the knowledge about the Alternative fuels used in automobile, performance and Emissions of automobile and its control of international standards.</p>
ME862PE	Professional Elective–VI Advanced Mechanics of Solids	<p>At the end of this course, each student should be able to:</p> <p>CO1: Determined the point of location of applied load to avoid twisting in thin sections used in aerospace applications.</p> <p>CO2: Understand the concept of distinguish between neutral and centroidal axes in curved beams.</p> <p>CO3: Understanding the analogy models developed for analyzing the non circular bars subjected to torsion, and also analyzing the stresses developed between rolling bodies and stress in three dimensional bodies.</p>

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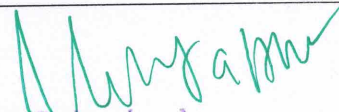
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ME863PE	Professional Elective–VI Unconventional Machining Processes	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the basic techniques of machining processes modeling</p> <p>CO2: Understand the mechanical aspects of orthogonal cutting mechanics</p> <p>CO3: Understand the thermal aspects of orthogonal cutting mechanics</p> <p>CO4: Ability to extend, through modeling Techniques, the single point, multiple point and abrasive machining processes</p> <p>CO5: Estimate the material removal rate and cutting force, in an industrially useful manner, for practical machining processes.</p>
ME864PE	Professional Elective–VI Advanced Materials Technology	<p>At the end of this course, each student should be able to:</p> <p>CO1: To select appropriate advanced materials processes for a given product or component recognizing material, size, precision, and surface quality requirements.</p> <p>CO2: To conduct theoretical and experimental analysis for advanced materials removal and laser processing technologies.</p>
ME801PC	Major Project	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to implement and execute well defined Objective.</p> <p>CO2: Ability to work in team at component level and system level.</p> <p>CO3: Ability to troubleshoot.</p>

Open Elective –I

(Common for EEE, ECE, CSE, IT, ME)

Course Code	Course Title / Name	Course Outcomes
CE600OE	Open Elective –I Disaster Preparedness & Planning Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: The application of Disaster Concepts to Management</p> <p>CO2: Analyzing Relationship between Development and Disasters.</p> <p>CO3: Ability to understand Categories of Disasters</p> <p>CO4: Realization of the responsibilities to society</p>


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CS600OE	Open Elective –I Entrepreneurship	<p>At the end of this course, each student should be able to:</p> <p>It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.</p>
CS601OE	Open Elective –I Fundamentals of Management for Engineers	<p>At the end of this course, each student should be able to:</p> <p>The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.</p>
CS602OE	Open Elective –I Cyber Law & Ethics	<p>At the end of this course, each student should be able to:</p> <p>CO1: The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.</p> <p>CO2: The students will learn the rights and responsibilities as an employee, team member and a global citizen</p>
EC600OE	Open Elective –I Fundamentals of Internet of Things	<p>At the end of this course, each student should be able to:</p> <p>CO1: Known basic protocols in sensor networks.</p> <p>CO2: Program and configure Arduino boards for various designs.</p>
		<p>CO3: Python programming and interfacing for Raspberry Pi.</p> <p>CO4: Design IoT applications in different domains</p>
EI600OE	Open Elective –I Basics Of Sensors Technology	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify suitable sensors and transducers for real time applications.</p> <p>CO2: Translate theoretical concepts into working models.</p> <p>CO3: Design the experimental applications to engineering modules and practices.</p> <p>CO4: Design engineering solution to the Industry/Society needs and develop products.</p>

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EE600OE	Open Elective –I Reliability Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Model various systems applying reliability networks</p> <p>CO2: Evaluate the reliability of simple and complex systems</p> <p>CO3: Estimate the limiting state probabilities of repairable systems</p> <p>CO4: Apply various mathematical models for evaluating reliability of irreparable systems</p>
EE601OE	Open Elective –I Renewable Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the principles of wind power and solar photovoltaic power generation, fuel cells.</p> <p>CO2: Assess the cost of generation for conventional and renewable energy plants</p> <p>CO3: Design suitable power controller for wind and solar applications</p> <p>CO4: Analyze the issues involved in the integration of renewable energy sources to the grid</p>
ME600OE	Open Elective –I Quantitative Analysis for Business Decisions	<p>At the end of this course, each student should be able to:</p> <p>CO1: Familiar with issues that would crop up in business</p> <p>CO2: Able to formulate Mathematical Model to resolve the issue</p>
		<p>CO3: Able to select technique for solving the formulated Mathematical Model</p> <p>CO4: Able to analyze the results obtained through the selected technique for implementation.</p>



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MT600OE	Open Elective –I Industrial Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Choose, prepare, interpret and use cost estimates as a basis for the different situations in an industrial company.</p> <p>CO2: Interpret financial statements and other financial reports of industrial companies, including the income statement, the balance sheet, the cash flow statement and key measures.</p> <p>CO3: Explain how strategic planning, management, management control, entrepreneurship, organization, production and learning works in an industrial company.</p> <p>CO4: Explain how the industrial company markets and price its products.</p> <p>CO5: Explain how the company deal with its environment.</p>
MT601OE	Open Elective –I Non-Conventional Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells.</p> <p>CO2: Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation.</p> <p>CO3: Explore the concepts involved in wind energy conversion system by studying its components, types and performance.</p> <p>CO4: Illustrate ocean energy and explain the operational methods of their utilization.</p> <p>CO5: Acquire the knowledge on Geothermal energy.</p>

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PE600OE	Open Elective –I General Geology	<p>At the end of this course, each student should be able to:</p> <p>The student would understand the basics of geology, viz: formation of earth, layers of earth, different types of rocks, formation of sedimentary basins and the micro fossils and their relationship to oil and gas.</p>
MM600OE	Open Elective –I Testing of Materials	<p>At the end of this course, each student should be able to:</p> <p>CO1: Classify mechanical testing of ferrous and non-ferrous metals and alloys.</p> <p>CO2: Recognize the importance of crystal defects including dislocations in plastic deformation.</p> <p>CO3: Identify the testing methods for obtaining strength and hardness.</p> <p>CO4: Examine the mechanisms of materials failure through fatigue and creep</p>
MM601OE	Open Elective –I Alloy Steels	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to understand different types of alloys used in alloy steels.</p> <p>CO2: Ability to solve different metallurgical problems in alloy steels.</p> <p>CO3: It has a lot of scope in R&D and in automobile engineering.</p>
MN600OE	Open Elective –I Introduction to Mining Technology	<p>At the end of this course, each student should be able to:</p> <p>Upon completion of the course, the student shall be able to understand various stages in the life of the mine, drilling, blasting and shaft sinking.</p>
MN601OE	Open Elective –I Coal Gasification, CBM & Shale Gas	<p>At the end of this course, each student should be able to:</p> <p>Student can get specialized in the underground coal gasification concepts, application and future scope in various geominig conditions.</p>

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Open Elective –III
(Common for EEE, ECE, CSE, IT, ME)

Course Code	Course Title / Name	Course Outcomes
AE831OE	Open Elective – III Air Transportation Systems	At the end of this course, each student should be able to: CO1: Explain the air transport systems. CO2: Describe the aircraft characteristics, airlines and airport operation. CO3: Apply the Air Navigation System & Environmental Systems.
AE832OE	Open Elective – III Rockets and Missiles	At the end of this course, each student should be able to: CO1: Design a preliminary chemical rocket engine CO2: Compute various types of aerodynamic forces acting on the rocket and missile during the flight. CO3: Determine the various equations of motion used in rocket and missile technology CO4: Illustrate staging of rockets and its performance estimation. CO5: Judge the materials for rocket and missile components.
AM831OE	Open Elective – III Introduction to Mechatronics	At the end of this course, each student should be able to: At the end of the course, the student will be able to, Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product. Develop PLC programs for a given task. Evaluate the performance of mechatronic systems.
AM832OE	Open Elective – III Microprocessors and Microcontrollers	At the end of this course, each student should be able to: CO1: Understands the internal architecture and organization of 8086, 8051 and ARM processors / controllers.

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		CO2: Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor / micro controller based systems.
BM831OE	Open Elective – III Telemetry and Telecontrol	At the end of this course, each student should be able to: Upon completion of this course students will appreciate the application of different telemetry systems and control to any process.
BM832OE	Open Elective – III Electromagnetic Interference and Compatibility	At the end of this course, each student should be able to: CO1: Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems. CO2: Analyze various sources of EMI and various possibilities to provide EMC. CO3: Understand and analyze possible EMI prevention techniques such as grounding, shielding, filtering, and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.
CE831OE	Open Elective – III Environmental Impact Assessment	At the end of this course, each student should be able to: CO1: Identify the environmental attributes to be considered for the EIA study. CO2: Formulate objectives of the EIA studies. CO3: Identify the suitable methodology and prepare Rapid EIA. CO4: Identify and incorporate mitigation measures.
CE832OE	Open Elective – III Optimization Techniques in Engineering	At the end of this course, each student should be able to: CO1: Formulate optimization problem. CO2: Solve the problem by using a appropriate optimization techniques.
CE833OE	Open Elective – III Entrepreneurship and Small Business Enterprises	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development

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		which will help them to provide vision for their own Start-up.
CN831OE	Open Elective – III Remote Sensing and GIS	<p>At the end of this course, each student should be able to:</p> <p>CO1: Retrieve the information content of remotely sensed data.</p> <p>CO2: Analyze the energy interactions in the atmosphere and earth surface features.</p> <p>CO3: Interpret the images for preparation of thematic maps.</p> <p>CO4: Apply problem specific remote sensing data for engineering applications.</p> <p>CO5: Analyze spatial and attribute data for solving spatial problems.</p> <p>CO6: Create GIS and cartographic outputs for presentation.</p>
CS831OE	Open Elective – III Linux Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Work confidently in Linux environment.</p> <p>CO2: Work with shell script to automate different tasks as Linux administration.</p>
CS832OE	Open Elective – III R Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to use and program in the Programming language R.</p> <p>CO2: Be able to use R to solve statistical problems.</p> <p>CO3: Be able to implement and describe Monte Carlo the technology.</p> <p>CO4: Be able to minimize and maximize functions using R.</p>
CS833OE	Open Elective – III PHP Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to develop a form containing several fields and be able to process the data provided on the form by a user in a PHP- based script.</p> <p>CO2: Understand basic PHP syntax for variable use and standard language constructs, such as conditionals and loops.</p>



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		<p>CO3: Understand the syntax and use of PHP object-oriented classes.</p> <p>CO4: Understand the syntax and functions available to deal with file processing for files on the server as well as processing web URLs.</p> <p>CO5: Understand the paradigm for dealing with form-based data, both from the syntax of HTML forms, and how they are accessed inside a PHP-based script.</p>
EC831OE	Open Elective – III Electronic Measuring Instruments	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.</p> <p>CO2: Measure various physical parameters by appropriately selecting the transducers.</p> <p>CO3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.</p>
EM831OE	Open Elective – III Data Analytics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the impact of data analytics for business decisions and strategy.</p> <p>CO2: Carry out data analysis/statistical analysis</p> <p>CO3: To carry out standard data visualization and formal inference procedures.</p> <p>CO4: Design Data Architecture</p> <p>CO5: Understand various Data Sources.</p>
EE831OE	Open Elective – III Entrepreneur Resource Planning	<p>At the end of this course, each student should be able to:</p> <p>ERP System Implementation options, and functional modules of ERP.</p> <p>CO1: Introduction to ERP- Foundation for Understanding ERP systems-Business benefits of ERP-The challenges of implementing ERP system-ERP modules and Historical Development.</p> <p>Case: Response to RFP for ERP system (Mary Sumner).</p>


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		<p>CO2: ERP system options & Selection methods- Measurement of project Impact- information Technology Selection-ERP proposal evaluation-Project Evaluation Technique. Case: Atlantic Manufacturing (Mary Sumner).</p> <p>CO3: ERP system Installation Options- IS/IT Management results-Risk Identification analysis-System Projects- Demonstration of the system-Failure method-system Architecture & ERP (David L. Olson) Case: Data Solutions & Technology Knowledge (Mary Sumner).</p> <p>CO4: ERP - sales and Marketing- Management control process in sales and marketing – ERP customer relationship management - ERP systems- Accounting & Finance control processes. Financial modules in ERP systems. Case: Atlantic manufacturing (Mary Sumner).</p> <p>CO5: ERP – Production and Material Management- Control process on production and manufacturing - Production module in ERP- supply chain Management & e-market place-e-business & ERP-e supply chain & ERP- Future directions for ERP. Case: HR in Atlantic manufacturing. (Mary Sumner).</p>
EE832OE	Open Elective – III Management Information Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the usage of MIS in organizations and the constituents of the MIS.</p> <p>CO2: Understand the classifications of MIS, understanding of functional MIS and the different functionalities of these MIS. This would be followed by case study on Knowledge management.</p> <p>CO3: Assess the requirement and stage in which the organization is placed. Nolan model is expected to aid such decisions.</p> <p>CO4: Learn the functions and issues at each stage</p>

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		of system development. Further different ways in which systems can be developed are also learnt.
EE833OE	Open Elective – III Organizational Behaviour	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyse the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behaviour.</p> <p>CO2: Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behaviour.</p> <p>CO3: Critically evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behaviour.</p> <p>CO4: Analyse organizational behavioural issues in the context of organizational behaviour theories, models and concepts.</p>
EI831OE	Open Elective – III Sensors and Transducers,	<p>At the end of this course, each student should be able to:</p> <p>Upon completion of this course the student shall be able to understand the working of basic sensors and transducers used in any industries.</p>
EI832OE	Open Elective – III PC Based Instrumentation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands measurement and analyzing techniques of digital computer power and performance .</p> <p>CO2: Understands the various types of interfacing systems and components.</p> <p>CO3: Develops the knowledge of real-time systems and case studies in instrumentation .</p> <p>CO4: Capability to analyze PC based data .</p> <p>CO5: Capable to develop instrumentation systems on various processes of industrial measurements.</p>
ME831OE	Open Elective – III Total Quality Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Evaluate the principles of quality</p>

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		<p>management and to explain how these principles can be applied within quality management systems.</p> <p>CO2: Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.</p> <p>CO3: Critically appraise the organisational, communication and teamwork requirements for effective quality management.</p> <p>CO4: Critically analyse the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans.</p>
ME832OE	Open Elective – III Industrial Safety, Health, and Environmental Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: To list out important legislations related to Health, Safety and Environment</p> <p>CO2: To list out requirements mentioned in factories act for the prevention of accidents. To understand the health and welfare provisions given in factories act.</p> <p>CO3: To understand the statutory requirements for an Industry on registration, license and its renewal.</p> <p>CO4: To prepare onsite and offsite emergency plan.</p>
ME833OE	Open Elective – III Basics of Thermodynamics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand and differentiate between different thermodynamic systems and processes.</p> <p>CO2: Understand and apply the laws of Thermodynamics to different types of system undergoing various processes.</p> <p>CO3: Understand and analyze the Thermodynamic Cycles.</p>
ME834OE	Open Elective – III Reliability Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Model various systems applying reliability networks.</p>

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		<p>CO2: Evaluate the reliability of simple and complex systems.</p> <p>CO3: Estimate the limiting state probabilities of repairable systems.</p> <p>CO4: Apply various mathematical models for evaluating reliability of irreparable systems.</p>
NT831OE	Open Elective – III Concepts of Nano Science And Technology	<p>At the end of this course, each student should be able to:</p> <p>The intended course covers the whole spectrum of nanomaterials ranging from introduction, classification, synthesis, properties, and characterization tools of nanophase materials to application including some new developments in various aspects.</p>
NT832OE	Open Elective – III Synthesis of Nanomaterials	<p>At the end of this course, each student should be able to:</p> <p>To provide abundant knowledge on various synthesis methods of nanomaterials.</p>
NT833OE	Open Elective – III Characterization of Nanomaterials	<p>At the end of this course, each student should be able to:</p> <p>CO1: The student will develop a fundamental knowledge of nanomaterials. .</p> <p>CO2: The student will demonstrate an understanding of the properties of materials with strong dependence on size.</p> <p>CO3: The student will demonstrate an understanding of approaches to nanomaterials characterization.</p>
MT831OE	Open Elective – III Renewable Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding of renewable energy sources.</p> <p>CO2: Knowledge of working principle of various energy systems.</p> <p>CO3: Capability to carry out basic design of renewable energy systems.</p>
MT832OE	Open Elective – III Production Planning and Control	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to,</p>


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		Understand production systems and their characteristics. Evaluate MRP and JIT systems against traditional inventory control systems. Understand basics of variability and its role in the performance of a production system. Analyze aggregate planning strategies. Apply forecasting and scheduling techniques to production systems. Understand theory of constraints for effective management of production systems.
MT833OE	Open Elective – III Entrepreneurship and Small Business Enterprises	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.
MM831OE	Open Elective – III Design and Selection of Engineering Materials	At the end of this course, each student should be able to: Understand the Relationship between materials selection, processing and applications.
MN831OE	Open Elective – III Solid Fuel Technology	At the end of this course, each student should be able to: Students can understand the fundamentals of Processes of formation of coal, properties and evaluation and coal preparation and washability characteristics of coal.
MN832OE	Open Elective – III Health & Safety in Mines	At the end of this course, each student should be able to: CO1: Gain insights of safety management system and risk management in Indian mining industries. CO2: Formulate safety audits and control in mining industries. CO3: Produce risk analysis using statistical methods and analysis of mine accidents.

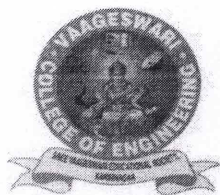

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PE831OE	Open Elective – III Disaster Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding Disasters, man-made Hazards and Vulnerabilities.</p> <p>CO2: Understanding disaster management mechanism.</p> <p>CO3: Understanding capacity building concepts and planning of disaster managements.</p>
PE832OE	Open Elective – III Fundamentals of Liquefied Natural Gas	<p>At the end of this course, each student should be able to:</p> <p>CO1: Have good knowledge on LNG process.</p> <p>CO2: Classify different liquefaction techniques.</p> <p>CO3: Understand different units in LNG processing and transportation.</p> <p>CO4: Have knowledge associated with safety aspects of LNG.</p>
PE833OE	Open Elective – III Health, Safety and Environment in Petroleum Industry	<p>At the end of this course, each student should be able to:</p> <p>CO1: The student can have the knowledge of various Acts related to safety, Health and environment in petroleum industry.</p> <p>CO2: The student can have the knowledge of various drilling fluids handling and safe disposal such toxic products.</p> <p>CO3: Knowledge of disaster management to fight any crisis.</p> <p>CO4: Knowledge of Hazard studies and occupational health hazards in the industry.</p>


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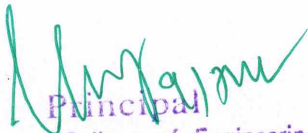
Beside LMD Police Station, Ramakrishna Colony,
KARIMNAGAR, Telangana state – 505 527
Affiliated to Jawaharlal Nehru Technological University Hyderabad,
Approved by AICTE New Delhi

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

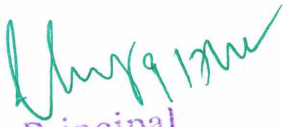
COURSE OUTCOMES (COs)

B.Tech. II Year I Sem R18 Regulation Electronics And Communication Engineering

Course Code	Course Title / Name	Course Outcomes
EC301PC	Electronic Devices and Circuits	At the end of this course, each student should be able to: CO1: Know the characteristics of various components. CO2: Understand the utilization of components. CO3: Understand the biasing techniques CO4: Design and analyze small signal amplifier circuits.
EC302PC	Network Analysis and Transmission Lines	At the end of this course, each student should be able to: CO1: Gain the knowledge on basic RLC circuits behavior. CO2: Analyze the Steady state and transient analysis of RLC Circuits. CO3: Know the characteristics of two port network parameters. CO4: Analyze the transmission line parameters and configurations.
EC303PC	Digital System Design	At the end of this course, each student should be able to: CO1: Understand the numerical information in different forms and Boolean Algebra theorems CO2: Postulates of Boolean algebra and to minimize combinational functions CO3: Design and analyze combinational and


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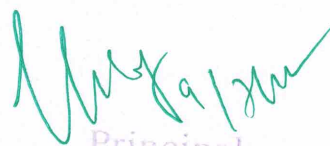
		sequential circuits CO4: Known about the logic families and realization of logic gates.
EC304PC	Signals and Systems	At the end of this course, each student should be able to: CO1: Differentiate various signal functions. CO2: Represent any arbitrary signal in time and frequency domain. CO3: Understand the characteristics of linear time invariant systems. CO4: Analyze the signals with different transform technique
EC305ES	Probability Theory and Stochastic Processes	At the end of this course, each student should be able to: CO1: Understand the concepts of Random Process and its Characteristics. CO2: Understand the response of linear time Invariant system for a Random Processes. CO3: Determine the Spectral and temporal characteristics of Random Signals. CO4: Understand the concepts of Noise in Communication systems.
EC306PC	Electronic Devices and Circuits Lab	At the end of this course, each student should be able to: CO1: Analyze circuits in different biasing modes. CO2: Identify the suitable devices based on characteristics and operating conditions CO3: Design circuits based on specifications. CO4: Distinguish various devices and operate safely within the limit of operation. CO5: Understand the functioning of various electronic circuits.
MC309	Constitution of India	At the end of this course, each student should be able to: CO1 : Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration.


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		<p>CO2: Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.</p> <p>CO3: Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.</p> <p>CO4: Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.</p>
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B.Tech. II Year II Sem R18 Regulation Electronics And Communication Engineering

Course Code	Course Title / Name	Course Outcomes
MA401BS	Laplace Transforms, Numerical Methods & Complex Variables	<p>At the end of this course, each student should be able to:</p> <p>CO1: Use the Laplace transforms techniques for solving ODE's</p> <p>CO2: Find the root of a given equation.</p> <p>CO3: Estimate the value for the given data using interpolation</p> <p>CO4: Find the numerical solutions for a given ODE's</p> <p>CO5: Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.</p> <p>CO6: Taylor's and Laurent's series expansions of complex Function</p>

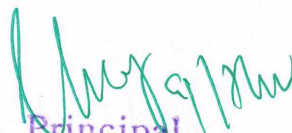


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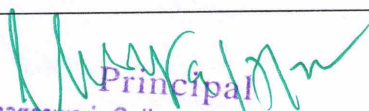
EC402PC	Electromagnetic Fields and Waves	<p>At the end of this course, each student should be able to:</p> <p>CO1: Get the knowledge of Basic Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields.</p> <p>CO2: Distinguish between the static and time-varying fields, establish the corresponding sets of Maxwell's Equations and Boundary Conditions.</p> <p>CO3: Analyze the Wave Equations for good conductors, good dielectrics and evaluate the UPW Characteristics for several practical media of interest.</p> <p>CO4: To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical problems.</p>
EC403PC	Analog and Digital Communications	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze and design of various continuous wave and angle modulation and demodulation techniques</p> <p>CO2: Understand the effect of noise present in continuous wave and angle modulation techniques.</p> <p>CO3: Attain the knowledge about AM , FM Transmitters and Receivers</p> <p>CO4: Analyze and design the various Pulse Modulation Techniques.</p> <p>CO5: Understand the concepts of Digital Modulation Techniques and Baseband transmission.</p>
EC404PC	Linear IC Applications	<p>At the end of this course, each student should be able to:</p> <p>CO1: A thorough understanding of operational amplifiers with linear integrated circuits.</p> <p>CO2: Attain the knowledge of functional diagrams and applications of IC 555 and IC 565</p> <p>CO3: Acquire the knowledge about the Data converters.</p>


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EC405PC	Electronic Circuit Analysis	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design the multistage amplifiers and understand the concepts of High Frequency Analysis of Transistors.</p> <p>CO2: Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to generate sustained oscillations .</p> <p>CO3: Design and realize different classes of Power Amplifiers and tuned amplifiers useable for audio and Radio applications.</p> <p>CO4: Design Multivibrators and sweep circuits for various applications.</p>
EC406PC	Analog and Digital Communications Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand basic elements of a communication system</p> <p>CO2: Conduct analysis of baseband signals in time domain and in frequency domain</p>
		<p>CO3: Demonstrate understanding of various analog and digital modulation and demodulation techniques techniques.</p> <p>CO4: Analyse the performance of modulation and demodulation techniques in various transmission environments</p> <p>CO5: Appreciate the importance of synchronisation in communication systems</p>
EC407PC	IC Applications Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students will have a thorough understanding of operational amplifier(741) .</p> <p>CO2: Students will be able to design circuits using operational amplifiers for various applications.</p> <p>CO3: Students will be able to design various combinational circuits using various Digital Integrated IC's.</p> <p>CO4: They can know the differences between Linear and Digital Integrated IC's.</p> <p>CO5: Students will demonstrate their knowledge by designing analog circuits & digital circuits.</p>



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EC408PC	Electronic Circuit Analysis Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Comprehend the fundamentals of multistage amplifiers, feedback, power amplifiers and oscillator circuits</p> <p>CO2: Analyze the circuit design process and simulate the common base, common emitter and common collector amplifier circuits</p> <p>CO3: Know the origin of failure of a circuit when it is in an application</p> <p>CO4: Acquaint with the design and simulate the RC coupled and Cascade amplifier circuits</p> <p>CO5: Discriminate the design and simulate various oscillator circuits</p> <p>CO6: Interpret to design and simulate Darlington pair,</p> <p>CO7: Create the design and simulate the cascade,</p>
		class A power amplifier circuits, and single tuned voltage amplifier circuits
*MC409	Gender Sensitization Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students will have developed a better understanding of important issues related to gender in contemporary India.</p> <p>CO2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.</p> <p>CO3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.</p> <p>CO4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.</p> <p>CO5: Men and women students and professionals will be better equipped to work and live together as equals.</p> <p>CO6: Students will develop a sense of appreciation of women in all walks of life.</p> <p>CO7: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.</p>


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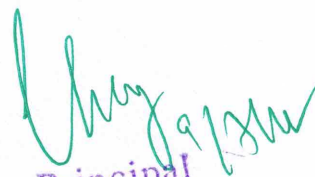
B.Tech. III Year I Sem R18 Regulation Electronics And Communication Engineering

Course Code	Course Title / Name	Course Outcomes
EC501PC	Microprocessors & Microcontrollers	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands the internal architecture, organization and assembly language programming of 8086 processors.</p> <p>CO2: Understands the internal architecture, organization and assembly language programming of 8051/controllers</p> <p>CO3: Understands the interfacing techniques to 8086 and 8051 based systems.</p> <p>CO4: Understands the internal architecture of ARM processors and basic concepts of advanced ARM processors.</p>
EC502PC	Data Communications and Networks	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know the Categories and functions of various Data communication Networks</p> <p>CO2: Design and analyze various error detection techniques.</p> <p>CO3: Demonstrate the mechanism of routing the data in network layer</p> <p>CO4: Know the significance of various Flow control and Congestion control Mechanisms</p> <p>CO5: Know the Functioning of various Application layer Protocols.</p>
EC503PC	Control Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the modeling of linear-time- invariant systems using transfer function and state space representations.</p> <p>CO2: Understand the concept of stability and its assessment for linear-time invariant systems.</p> <p>CO3: Design simple feedback controllers.</p>



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SM504MS	Business Economics & Financial Analysis	<p>At the end of this course, each student should be able to:</p> <p>The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.</p>
EC511PE	Professional Elective – I : Computer Organization & Operating Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to visualize the organization of different blocks in a computer.</p> <p>CO2: Able to use micro-level operations to control different units in a computer.</p> <p>CO3: Able to use Operating systems in a computer.</p>
EC512PE	Professional Elective – I : Error Correcting Codes	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to transmit and store reliable data and detect errors in data through coding.</p> <p>CO2: Able to understand the designing of various codes like block codes, cyclic codes, convolution codes, turbo codes and space codes.</p>
EC513PE	Professional Elective – I : Electronic Measurements and Instrumentation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Measure electrical parameters with different meters and understand the basic definition of measuring parameters.</p> <p>CO2: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.</p> <p>CO3: Operate an Oscilloscope to measure various signals.</p> <p>CO4: Measure various physical parameters by appropriately selecting the transducers.</p>
EC505PC	Microprocessors & Microcontrollers Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate ability to handle arithmetic operations using assembly language</p>


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		<p>programming in TASM and training boards</p> <p>CO2: Demonstrate ability to handle logical operations using assembly language programming in TASM</p> <p>CO3: Demonstrate ability to handle string instructions using assembly language programming in TASM</p> <p>CO4: Demonstrate ability to handle sorting operations and using assembly language programming in TASM</p>
EC506PC	Data Communications and Networks Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the rudiments of how computers communicate.</p> <p>CO2: Be familiar with the architecture of a number of different networks.</p> <p>CO3: Understand the principles of protocol layering.</p> <p>CO4: Be familiar with modern communication systems.</p> <p>CO5: Understand the basic aspects of packet-based protocol design and implementation.</p>
EN508HS	Advanced Communication Skills Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: To improve fluency in English through a well developed vocabulary and enable them to listen at normal conversational speed by educated English speakers and respond appropriately in different socio cultural and professional context</p> <p>CO2: Further, they would be required to communicate their ideas relevantly and coherently in writing</p> <p>CO3: To prepare all the students for their placements</p> <p>CO4: Learn to overcome stage fear and make presentations with ease</p> <p>CO5: Learn how to pronounce words using the rules they have been taught</p>



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*MC510	Intellectual Property Rights	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.</p> <p>CO2: Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.</p> <p>CO3: Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.</p> <p>CO4: Be familiar with the processes of Intellectual Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.</p> <p>CO5: Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.</p> <p>CO6: Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;</p>
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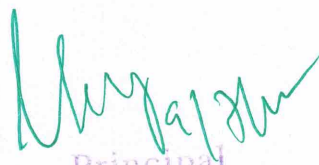


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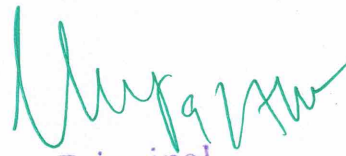
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B.Tech. III Year II Sem R18 Regulation Electronics And Communication Engineering

Course Code	Course Title / Name	Course Outcomes
EC601PC	Antennas And Propagation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Characterize the antennas based on frequency, configure the geometry and establish the radiation patterns of VHF, UHF and Microwave antennas and also antenna arrays.</p> <p>CO2: Specify the requirements for microwave measurements and arrange a setup to carry out the antenna far zone pattern and gain measurements in the laboratory.</p> <p>CO3: Classify the different wave propagation mechanisms, determine the characteristic features of different wave propagations, and estimate the parameters involved.</p>
EC602PC	Digital Signal Processing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the LTI system characteristics and Multirate signal processing.</p> <p>CO2: Understand the inter-relationship between DFT and various transforms.</p> <p>CO3: Design a digital filter for a given specification.</p> <p>CO4: Understand the significance of various filter structures and effects of round off errors.</p>
EC603PC	VLSI DESIGN	<p>At the end of this course, each student should be able to:</p> <p>CO1: Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors.</p> <p>CO2: Draw the layout of any logic circuit which helps to understand and estimate parasitic effect of any logic circuit</p> <p>CO3: Design building blocks of data path systems, memories and simple logic circuits using PLA, PAL, FPGA and CPLD.</p> <p>CO4: Understand different types of faults that can</p>


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		occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.
EC611PE	Professional Elective – II: Object Oriented Programming through Java	<p>At the end of this course, each student should be able to:</p> <p>CO1: Develop Applications for Range of Problems Using Object-Oriented Programming Techniques</p> <p>CO2: Design Simple Graphical User Interface Applications.</p>
EC612PE	Professional Elective – II: Mobile Communications and Networks	<p>At the end of this course, each student should be able to:</p> <p>CO1: Known the evolution of cellular and mobile communication system.</p> <p>CO2: The student will be able to understand Co-Channel and Non-Co-Channel interferences.</p> <p>CO3: Understand impairments due to multipath fading channel and how to overcome the different fading effects.</p> <p>CO4: Familiar with cell coverage for signal and traffic, diversity, techniques, frequency management, Channel assignment and types of handoff.</p> <p>CO5: Know the difference between cellular and Adhoc Networks and design goals of MAC Layer protocol.</p>
EC613PE	Professional Elective – II: Embedded System Design	<p>At the end of this course, each student should be able to:</p> <p>CO1: To understand the selection procedure of Processors in the embedded domain.</p> <p>CO2: Design Procedure for Embedded Firmware.</p> <p>CO3: To visualize the role of Real time Operating Systems in Embedded Systems.</p> <p>CO4: To evaluate the Correlation between task synchronization and latency issues</p>
	Open Elective – I	
EC604PC	Digital Signal Processing Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the handling of discrete/digital</p>


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		<p>signals using MATLAB</p> <p>CO2: Understand the basic operations of Signal processing</p> <p>CO3: Analyse the spectral parameter of window functions</p> <p>CO4: Design IIR, and FIR filters for band pass, band stop, low pass and high pass filters.</p> <p>CO5: Design the signal processing algorithm using MATLAB & VLAB.</p>
EC605PC	e – CAD Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate basic concepts of the AutoCAD software</p> <p>CO2: Apply basic concepts to develop construction (drawing) techniques</p> <p>CO3: Ability to manipulate drawings through editing and plotting techniques</p> <p>CO4: Understand geometric construction</p> <p>CO5: Produce template drawings</p> <p>CO6: Produce 2D Orthographic Projections</p> <p>CO7: Understand and demonstrate dimensioning concepts and techniques</p> <p>CO8: Understand Section and Auxiliary Views</p> <p>CO9: Become familiar with the use of Blocks, Design Center, and Tool Palettes</p> <p>CO10: Become familiar with Solid Modeling concepts and techniques.</p>
EC606PC	Scripting Languages Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to understand the differences between Scripting languages and programming languages</p> <p>CO2: Able to gain some fluency programming in Ruby, Perl, TCL</p>
*MC609	Environmental Science	<p>At the end of this course, each student should be able to:</p> <p>Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental</p>



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		regulations which in turn helps in sustainable development
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B.Tech. IV Year I Sem R16 Regulation Electronics And Communication Engineering

Course Code	Course Title / Name	Course Outcomes
EC701PC	Microwave Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: To analyze completely the rectangular waveguides, their mode characteristics, and design waveguides for solving practical microwave transmission line problems.</p> <p>CO2: To distinguish between the different types of waveguide and ferrite components, explain their functioning and select proper components for engineering applications.</p> <p>CO3: To distinguish between the methods of power generation at microwave frequencies, derive the performance characteristics of 2-Cavity and Reflex Klystrons, Magnetrons, TWTs and estimate their efficiency levels, and solve related numerical problems</p> <p>CO4: To realize the need for solid state microwave sources, understand the concepts of TEDs, RWH Theory and explain the salient features of Gunn Diodes and ATT Devices.</p> <p>CO5: To establish the properties of Scattering Matrix, formulate the S-Matrix for various microwave junctions, and understand the utility of S-parameters in microwave component design.</p> <p>CO6: To set up a microwave bench, establish the measurement procedure and conduct the experiments in microwave lab for measurement of various microwave parameters.</p>
EC721PE	Professional Elective – II Computer Networks	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students should understand and explore the basics of Computer Networks and Various</p>

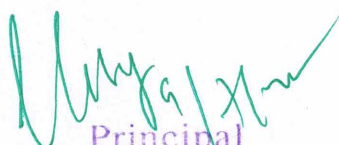
		<p>Protocols. He/ She will be in a position to understand the World Wide Web concepts.</p> <p>CO2: Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and ad hoc networks.</p>
EC722PE	Professional Elective – II FPGA Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate various architectures and device technologies of PLDs and CPLDs</p> <p>CO2: Illustrate aspects of FPGA Architectures.</p> <p>CO3: Explain SRAM Programmable FPGAs</p> <p>CO4: Explain Anti-Fuse Programmed FPGAs</p> <p>CO5: Analyze System level Design and their application for Combinational and Sequential Circuits</p>
EC723PE	Professional Elective – II Coding Theory and Techniques	<p>At the end of this course, each student should be able to:</p> <p>CO1: Learn measurement of information and errors.</p> <p>CO2: Obtain knowledge in designing various source codes and channel codes.</p> <p>CO3: Design encoders and decoders for block and cyclic codes.</p> <p>CO4: Understand the significance of codes in various applications.</p>
EC724PE	Professional Elective – II Soft Computing Techniques	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify and employ suitable soft computing techniques in classification and optimization problems.</p> <p>CO2: Design hybrid systems to suit a given real – life problem.</p>
EC731PE	Professional Elective– III Wireless Communications and Networks	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand cellular system design concepts.</p> <p>CO2: Analyze various multiple access schemes used in wireless communication.</p>


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		<p>CO3: Demonstrate wireless Local and Wide area networks and their specifications.</p> <p>CO4: Familiar with some of the existing and emerging wireless standards.</p> <p>CO5: Understand the concept of orthogonal frequency division multiplexing.</p>
EC732PE	<p>Professional Elective– III</p> <p>Internet of Things</p>	<p>At the end of this course, each student should be able to:</p> <p>CO1: Interpret the impact and challenges posed by IoT networks leading to new architectural models.</p> <p>CO2: Compare and contrast the deployment of smart objects and the technologies to connect them to network.</p> <p>CO3: Appraise the role of IoT protocols for efficient network communication.</p> <p>CO4: Elaborate the need for Data Analytics and Security in IoT.</p> <p>CO5: Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.</p>
EC733PE	<p>Professional Elective– III</p> <p>Radar Systems</p>	<p>At the end of this course, each student should be able to:</p> <p>CO1: Derive the complete radar range equation.</p> <p>CO2: Understand the need and functioning of CW, FM-CW and MTI radars</p> <p>CO3: Known various Tracking methods.</p> <p>CO4: Derive the matched filter response characteristics for radar receivers.</p>
EC734PE	<p>Professional Elective– III</p> <p>Embedded System Design</p>	<p>At the end of this course, each student should be able to:</p> <p>CO1: Expected to understand the selection procedure of Processors in the embedded domain.</p> <p>CO2: Design Procedure for Embedded Firmware.</p> <p>CO3: Expected to visualize the role of Real time Operating Systems in Embedded Systems.</p> <p>CO4: Expected to evaluate the Correlation between task synchronization and latency issues</p>


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EC741PE	Professional Elective– IV Optimization Techniques	<p>At the end of this course, each student should be able to:</p> <p>CO1: Explain the need of optimization of engineering systems</p> <p>CO2: Understand optimization of electrical and electronics engineering problems</p> <p>CO3: Apply classical optimization techniques, linear programming, simplex algorithm, transportation problem</p> <p>CO4: Apply unconstrained optimization and constrained non-linear programming and dynamic programming</p> <p>CO5: Formulate optimization problems.</p>
EC742PE	Professional Elective– IV Object Oriented Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to solve real world problems using OOP techniques.</p> <p>CO2: Able to understand the use of abstract classes.</p> <p>CO3: Able to solve problems using java collection framework and I/o classes.</p> <p>CO4: Able to develop multithreaded applications with synchronization.</p> <p>CO5: Able to develop applets for web applications.</p> <p>CO6: Able to design GUI based applications</p>
EC743PE	Professional Elective– IV Electronic Measurements and Instrumentation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.</p> <p>CO2: Measure various physical parameters by appropriately selecting the transducers.</p> <p>CO3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.</p>
EC744PE	Professional Elective– IV Artificial Intelligence	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to formulate an efficient problem</p>


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		<p>space for a problem expressed in natural language.</p> <p>CO2: Select a search algorithm for a problem and estimate its time and space complexities.</p> <p>CO3: Possess the skill for representing knowledge using the appropriate technique for a given problem.</p> <p>CO4: Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.</p>
EC702PC	VLSI Design	<p>At the end of this course, each student should be able to:</p> <p>CO1: Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors.</p> <p>CO2: Choose an appropriate inverter depending on specifications required for a circuit</p> <p>CO3: Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit</p> <p>CO4: Design different types of logic gates using CMOS inverter and analyze their transfer characteristics</p> <p>CO5: Provide design concepts required to design building blocks of data path using gates.</p> <p>CO6: Design simple memories using MOS transistors and can understand design of large memories.</p> <p>CO7: Design simple logic circuit using PLA, PAL, FPGA and CPLD.</p> <p>CO8: Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system</p>
EC703PC	VLSI and E-CAD Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: To learn the HDL programming language.</p> <p>CO2: To learn the simulation of basic gates using the basic programming language.</p>


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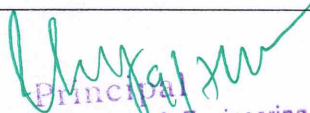
		<p>CO3: To learn the simulation of combinational circuits using programming language.</p> <p>CO4: To learn the simulation of sequential circuits using programming language.</p> <p>CO5: To learn the synthesis and layouts of analog and digital CMOS circuits.</p> <p>CO6: To develop an ability to simulate and synthesize various digital circuits</p>
EC704PC	Microwave Engineering Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design test bench for measurement of various microwave parameters.</p> <p>CO2: Analyze various characteristics of microwave junctions and design of microwave communication links.</p> <p>CO3: Integrating a wide range of Microwave components into one design oriented frame work</p> <p>CO4: Design and solve real world problems</p> <p>CO5: Use a microwave test bench in analyzing various types of microwave measurements.</p> <p>CO6: Measure the various parameters in microwave engineering.</p> <p>CO7: Design & analyze the micro wave integrated circuits.</p>
EC705PC	Industry Oriented Mini Project	<p>At the end of this course, each student should be able to:</p> <p>CO1: Formulate a real world problem and develop its requirements</p> <p>CO2: Student will be exposed to industrial awareness</p> <p>CO3: Self learning technologies, methods and/or techniques that contribute to the software solution of the project.</p>
EC706PC	Seminar	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to work in actual working environment.</p> <p>CO2: Ability to utilize technical resources</p>


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		CO3: Ability to write technical documents and give oral presentations related to the work completed.
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Course Code	Course Title / Name	Course Outcomes
	Open Elective – III	
EC851PE	Professional Elective –V Network Security and Cryptography	<p>At the end of this course, each student should be able to:</p> <p>CO1: Describe network security fundamental concepts and principles</p> <p>CO2: Encrypt and decrypt messages using block ciphers and network security technology and protocols</p> <p>CO3: Analyze key agreement algorithms to identify their weaknesses</p> <p>CO4: Identify and assess different types of threats, malware, spyware, viruses, vulnerabilities</p>
EC853PE	Professional Elective –V Optical Communications	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand and analyze the constructional parameters of optical fibres.</p> <p>CO2: Be able to design an optical system.</p> <p>CO3: Estimate the losses due to attenuation, absorption, scattering and bending.</p> <p>CO4: Compare various optical detectors and choose suitable one for different applications.</p>
EC854PE	Professional Elective –V Machine Learning	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the concepts of computational intelligence like machine learning</p> <p>CO2: Ability to get the skill to apply machine learning techniques to address the real time problems in different areas</p> <p>CO3: Understand the Neural Networks and its usage in machine learning application.</p>
EC861PE	Professional Elective –VI Actuators and Robot Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Undertake kinematics analysis of robot manipulators.</p>


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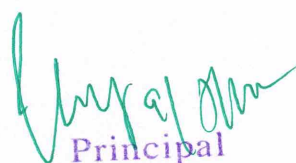
		<p>CO2: Understand the importance of robot dynamics.</p> <p>CO3: Have an understanding of the functionality and limitations of robot actuators and sensors.</p>
EC862PE	Professional Elective –VI Analog CMOS IC Design	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design basic building blocks of CMOS analog ICs.</p> <p>CO2: Carry out the design of single and two stage operational amplifiers and voltage references.</p> <p>CO3: Determine the device dimensions of each MOSFETs involved.</p> <p>CO4: Design various amplifiers like differential, current and operational amplifiers.</p>
EC863PE	Professional Elective –VI Global Positioning System	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify GPS components and their functions</p> <p>CO2: Select GPS survey method</p> <p>CO3: Interpret the navigational message and signals received by the GPS satellite</p> <p>CO4: Identify error sources in GPS observations, and apply the corrections for accurate positioning</p> <p>CO5: Map the geospatial features</p>
EC864PE	Professional Elective –VI Computer Vision	<p>At the end of this course, each student should be able to:</p> <p>CO1: Implement fundamental image processing techniques required for computer vision.</p> <p>CO2: Perform shape analysis.</p> <p>CO3: Implement boundary tracking techniques.</p> <p>CO4: Apply chain codes and other region descriptors.</p> <p>CO5: Apply Hough Transform for line, circle, and ellipse detections.</p> <p>CO6: Apply 3D vision techniques.</p> <p>CO7: Implement motion related techniques.</p> <p>CO8: Develop applications using computer vision</p>


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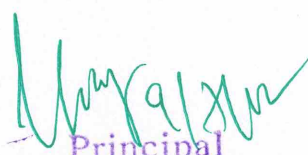
		techniques.
EC801PC	Major Project	At the end of this course, each student should be able to: CO1: Ability to implement and execute well defined objective CO2: Ability to work in team at component level and system level CO3: Ability to troubleshoot.

Open Elective –I
(Common for EEE, ECE, CSE, IT, ME)


Course Code	Course Title / Name	Course Outcomes
CE600OE	Open Elective –I Disaster Preparedness & Planning Management	At the end of this course, each student should be able to: CO1: The application of Disaster Concepts to Management CO2: Analyzing Relationship between Development and Disasters. CO3: Ability to understand Categories of Disasters CO4: Realization of the responsibilities to society
CS600OE	Open Elective –I Entrepreneurship	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.
CS601OE	Open Elective –I Fundamentals of Management for Engineers	At the end of this course, each student should be able to: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.


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CS602OE	Open Elective –I Cyber Law & Ethics	<p>At the end of this course, each student should be able to:</p> <p>CO1: The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.</p> <p>CO2: The students will learn the rights and responsibilities as an employee, team member and a global citizen</p>
EC600OE	Open Elective –I Fundamentals of Internet of Things	<p>At the end of this course, each student should be able to:</p> <p>CO1: Known basic protocols in sensor networks.</p> <p>CO2: Program and configure Arduino boards for various designs.</p> <p>CO3: Python programming and interfacing for Raspberry Pi.</p> <p>CO4: Design IoT applications in different domains</p>
EI600OE	Open Elective –I Basics Of Sensors Technology	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify suitable sensors and transducers for real time applications.</p> <p>CO2: Translate theoretical concepts into working models.</p> <p>CO3: Design the experimental applications to engineering modules and practices.</p> <p>CO4: Design engineering solution to the Industry/Society needs and develop products.</p>
EE600OE	Open Elective –I Reliability Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Model various systems applying reliability networks</p> <p>CO2: Evaluate the reliability of simple and complex systems</p> <p>CO3: Estimate the limiting state probabilities of repairable systems</p> <p>CO4: Apply various mathematical models for evaluating reliability of irreparable systems</p>


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EE601OE	Open Elective –I Renewable Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the principles of wind power and solar photovoltaic power generation, fuel cells.</p> <p>CO2: Assess the cost of generation for conventional and renewable energy plants</p> <p>CO3: Design suitable power controller for wind and solar applications</p> <p>CO4: Analyze the issues involved in the integration of renewable energy sources to the grid</p>
ME600OE	Open Elective –I Quantitative Analysis for Business Decisions	<p>At the end of this course, each student should be able to:</p> <p>CO1: Familiar with issues that would crop up in business</p> <p>CO2: Able to formulate Mathematical Model to</p>
		<p>resolve the issue</p> <p>CO3: Able to select technique for solving the formulated Mathematical Model</p> <p>CO4: Able to analyze the results obtained through the selected technique for implementation.</p>
MT600OE	Open Elective –I Industrial Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Choose, prepare, interpret and use cost estimates as a basis for the different situations in an industrial company.</p> <p>CO2: Interpret financial statements and other financial reports of industrial companies, including the income statement, the balance sheet, the cash flow statement and key measures.</p> <p>CO3: Explain how strategic planning, management, management control, entrepreneurship, organization, production and learning works in an industrial company.</p> <p>CO4: Explain how the industrial company markets and price its products.</p> <p>CO5: Explain how the company deal with its environment.</p>


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MT601OE	Open Elective –I Non-Conventional Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells.</p> <p>CO2: Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation.</p> <p>CO3: Explore the concepts involved in wind energy conversion system by studying its components, types and performance.</p> <p>CO4: Illustrate ocean energy and explain the operational methods of their utilization.</p> <p>CO5: Acquire the knowledge on Geothermal energy.</p>
PE600OE	Open Elective –I General Geology	<p>At the end of this course, each student should be able to:</p> <p>The student would understand the basics of geology, viz: formation of earth, layers of earth, different types of rocks, formation of sedimentary basins and the micro fossils and their relationship to oil and gas.</p>
MM600OE	Open Elective –I Testing of Materials	<p>At the end of this course, each student should be able to:</p> <p>CO1: Classify mechanical testing of ferrous and non-ferrous metals and alloys.</p> <p>CO2: Recognize the importance of crystal defects including dislocations in plastic deformation.</p> <p>CO3: Identify the testing methods for obtaining strength and hardness.</p> <p>CO4: Examine the mechanisms of materials failure through fatigue and creep</p>
MM601OE	Open Elective –I Alloy Steels	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to understand different types of alloys used in alloy steels.</p> <p>CO2: Ability to solve different metallurgical problems in alloy steels.</p> <p>CO3: It has a lot of scope in R&D and in automobile engineering.</p>

MN600OE	Open Elective –I Introduction to Mining Technology	At the end of this course, each student should be able to: Upon completion of the course, the student shall be able to understand various stages in the life of the mine, drilling, blasting and shaft sinking.
MN601OE	Open Elective –I Coal Gasification, CBM & Shale Gas	At the end of this course, each student should be able to: Student can get specialized in the underground coal gasification concepts, application and future scope in various geominning conditions.


Open Elective –III

(Common for EEE, ECE, CSE, IT, ME)


Course Code	Course Title / Name	Course Outcomes
AE831OE	Open Elective – III Air Transportation Systems	At the end of this course, each student should be able to: CO1: Explain the air transport systems. CO2: Describe the aircraft characteristics, airlines and airport operation. CO3: Apply the Air Navigation System & Environmental Systems.
AE832OE	Open Elective – III Rockets and Missiles	At the end of this course, each student should be able to: CO1: Design a preliminary chemical rocket engine CO2: Compute various types of aerodynamic forces acting on the rocket and missile during the flight. CO3: Determine the various equations of motion used in rocket and missile technology CO4: Illustrate staging of rockets and its performance estimation. CO5: Judge the materials for rocket and missile components.


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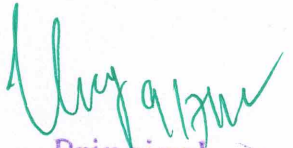
AM831OE	Open Elective – III Introduction to Mechatronics	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to, Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product. Develop PLC programs for a given task. Evaluate the performance of mechatronic systems.</p>
AM832OE	Open Elective – III Microprocessors and Microcontrollers	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands the internal architecture and organization of 8086, 8051 and ARM processors / controllers.</p>
		<p>CO2: Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor / micro controller based systems.</p>
BM831OE	Open Elective – III Telemetry and Telecontrol	<p>At the end of this course, each student should be able to:</p> <p>Upon completion of this course students will appreciate the application of different telemetry systems and control to any process.</p>
BM832OE	Open Elective – III Electromagnetic Interference and Compatibility	<p>At the end of this course, each student should be able to:</p> <p>CO1: Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems.</p> <p>CO2: Analyze various sources of EMI and various possibilities to provide EMC.</p> <p>CO3: Understand and analyze possible EMI revention techniques such as grounding, shielding, filtering, and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.</p>


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CE831OE	Open Elective – III Environmental Impact Assessment	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the environmental attributes to be considered for the EIA study.</p> <p>CO2: Formulate objectives of the EIA studies.</p> <p>CO3: Identify the suitable methodology and prepare Rapid EIA.</p> <p>CO4: Identify and incorporate mitigation measures.</p>
CE832OE	Open Elective – III Optimization Techniques in Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Formulate optimization problem.</p> <p>CO2: Solve the problem by using a appropriate optimization techniques.</p>
CE833OE	Open Elective – III Entrepreneurship and Small Business Enterprises	<p>At the end of this course, each student should be able to:</p> <p>It enables students to learn the basics of Entrepreneurship and entrepreneurial development</p>
		which will help them to provide vision for their own Start-up.
CN831OE	Open Elective – III Remote Sensing and GIS	<p>At the end of this course, each student should be able to:</p> <p>CO1: Retrieve the information content of remotely sensed data.</p> <p>CO2: Analyze the energy interactions in the atmosphere and earth surface features.</p> <p>CO3: Interpret the images for preparation of thematic maps.</p> <p>CO4: Apply problem specific remote sensing data for engineering applications.</p> <p>CO5: Analyze spatial and attribute data for solving spatial problems.</p> <p>CO6: Create GIS and cartographic outputs for presentation.</p>
CS831OE	Open Elective – III Linux Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Work confidently in Linux environment.</p> <p>CO2: Work with shell script to automate different tasks as Linux administration.</p>


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CS832OE	Open Elective – III R Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to use and program in the Programming language R.</p> <p>CO2: Be able to use R to solve statistical problems.</p> <p>CO3: Be able to implement and describe Monte Carlo the technology.</p> <p>CO4: Be able to minimize and maximize functions using R.</p>
CS833OE	Open Elective – III PHP Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to develop a form containing several fields and be able to process the data provided on the form by a user in a PHP- based script.</p> <p>CO2: Understand basic PHP syntax for variable use and standard language constructs, such as conditionals and loops.</p>
		<p>CO3: Understand the syntax and use of PHP object-oriented classes.</p> <p>CO4: Understand the syntax and functions available to deal with file processing for files on the server as well as processing web URLs.</p> <p>CO5: Understand the paradigm for dealing with form-based data, both from the syntax of HTML forms, and how they are accessed inside a PHP-based script.</p>
EC831OE	Open Elective – III Electronic Measuring Instruments	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.</p> <p>CO2: Measure various physical parameters by appropriately selecting the transducers.</p> <p>CO3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.</p>


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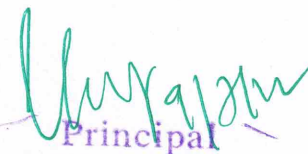
EM831OE	Open Elective – III Data Analytics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the impact of data analytics for business decisions and strategy.</p> <p>CO2: Carry out data analysis/statistical analysis</p> <p>CO3: To carry out standard data visualization and formal inference procedures.</p> <p>CO4: Design Data Architecture</p> <p>CO5: Understand various Data Sources.</p>
EE831OE	Open Elective – III Entrepreneur Resource Planning	<p>At the end of this course, each student should be able to:</p> <p>ERP System Implementation options, and functional modules of ERP.</p> <p>CO1: Introduction to ERP- Foundation for Understanding ERP systems-Business benefits of ERP-The challenges of implementing ERP system-ERP modules and Historical Development.</p> <p>Case: Response to RFP for an ERP system (Mary Sumner).</p>


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		<p>CO2: ERP system options & Selection methods- Measurement of project Impact- information Technology Selection-ERP proposal evaluation-Project Evaluation Technique. Case: Atlantic Manufacturing (Mary Sumner).</p> <p>CO3: ERP system Installation Options- IS/IT Management results-Risk Identification analysis-System Projects- Demonstration of the system-Failure method-system Architecture & ERP (David L. Olson) Case: Data Solutions & Technology Knowledge (Mary Sumner).</p> <p>CO4: ERP - sales and Marketing- Management control process in sales and marketing – ERP customer relationship management - ERP systems- Accounting & Finance control processes. Financial modules in ERP systems. Case: Atlantic manufacturing (Mary Sumner).</p> <p>CO5: ERP – Production and Material Management- Control process on production and manufacturing - Production module in ERP- supply chain Management & e-market place-e-business & ERP-e supply chain & ERP- Future directions for ERP. Case: HR in Atlantic manufacturing. (Mary Sumner).</p>
EE832OE	Open Elective – III Management Information Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the usage of MIS in organizations and the constituents of the MIS.</p> <p>CO2: Understand the classifications of MIS, understanding of functional MIS and the different functionalities of these MIS. This would be followed by case study on Knowledge management.</p> <p>CO3: Assess the requirement and stage in which the organization is placed. Nolan model is expected to aid such decisions.</p> <p>CO4: Learn the functions and issues at each stage</p>


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		of system development. Further different ways in which systems can be developed are also learnt.
EE833OE	Open Elective – III Organizational Behaviour	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyse the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behaviour.</p> <p>CO2: Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behaviour.</p> <p>CO3: Critically evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behaviour.</p> <p>CO4: Analyse organizational behavioural issues in the context of organizational behaviour theories, models and concepts.</p>
EI831OE	Open Elective – III Sensors and Transducers,	<p>At the end of this course, each student should be able to:</p> <p>Upon completion of this course the student shall be able to understand the working of basic sensors and transducers used in any industries.</p>
EI832OE	Open Elective – III PC Based Instrumentation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands measurement and analyzing techniques of digital computer power and performance .</p> <p>CO2: Understands the various types of interfacing systems and components.</p> <p>CO3: Develops the knowledge of real-time systems and case studies in instrumentation .</p> <p>CO4: Capability to analyze PC based data .</p> <p>CO5: Capable to develop instrumentation systems on various processes of industrial measurements.</p>
ME831OE	Open Elective – III Total Quality Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Evaluate the principles of quality</p>


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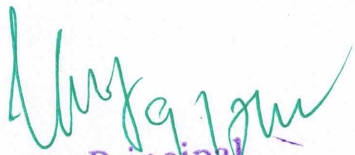
		<p>management and to explain how these principles can be applied within quality management systems.</p> <p>CO2: Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.</p> <p>CO3: Critically appraise the organisational, communication and teamwork requirements for effective quality management .</p> <p>CO4: Critically analyse the strategic issues in quality management, including current issues and developments, and to devise and evaluate quality implementation plans.</p>
ME832OE	Open Elective – III Industrial Safety, Health, and Environmental Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: To list out important legislations related to Health , Safety and Environment</p> <p>CO2: To list out requirements mentioned in factories act for the prevention of accidents. To understand the health and welfare provisions given in factories act.</p> <p>CO3: To understand the statutory requirements for an Industry on registration, license and its renewal.</p> <p>CO4: To prepare onsite and offsite emergency plan.</p>
ME833OE	Open Elective – III Basics of Thermodynamics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand and differentiate between different thermodynamic systems and processes.</p> <p>CO2: Understand and apply the laws of Thermodynamics to different types of system undergoing various processes.</p> <p>CO3: Understand and analyze the Thermodynamic Cycles.</p>
ME834OE	Open Elective – III Reliability Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Model various systems applying reliability networks.</p>


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		<p>CO2: Evaluate the reliability of simple and complex systems.</p> <p>CO3: Estimate the limiting state probabilities of repairable systems.</p> <p>CO4: Apply various mathematical models for evaluating reliability of irreparable systems.</p>
NT831OE	Open Elective – III Concepts of Nano Science And Technology	<p>At the end of this course, each student should be able to:</p> <p>The intended course covers the whole spectrum of nanomaterials ranging from introduction, classification, synthesis, properties, and characterization tools of nanophase materials to application including some new developments in various aspects.</p>
NT832OE	Open Elective – III Synthesis of Nanomaterials	<p>At the end of this course, each student should be able to:</p> <p>To provide abundant knowledge on various synthesis methods of nanomaterials.</p>
NT833OE	Open Elective – III Characterization of Nanomaterials	<p>At the end of this course, each student should be able to:</p> <p>CO1: The student will develop a fundamental knowledge of nanomaterials. .</p> <p>CO2: The student will demonstrate an understanding of the properties of materials with strong dependence on size.</p> <p>CO3: The student will demonstrate an understanding of approaches to nanomaterials characterization.</p>
MT831OE	Open Elective – III Renewable Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding of renewable energy sources.</p> <p>CO2: Knowledge of working principle of various energy systems.</p> <p>CO3: Capability to carry out basic design of renewable energy systems.</p>
MT832OE	Open Elective – III Production Planning and Control	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to,</p>


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		Understand production systems and their characteristics. Evaluate MRP and JIT systems against traditional inventory control systems. Understand basics of variability and its role in the performance of a production system. Analyze aggregate planning strategies. Apply forecasting and scheduling techniques to production systems. Understand theory of constraints for effective management of production systems.
MT833OE	Open Elective – III Entrepreneurship and Small Business Enterprises	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.
MM831OE	Open Elective – III Design and Selection of Engineering Materials	At the end of this course, each student should be able to: Understand the Relationship between materials selection, processing and applications.
MN831OE	Open Elective – III Solid Fuel Technology	At the end of this course, each student should be able to: Students can understand the fundamentals of Processes of formation of coal, properties and evaluation and coal preparation and washability characteristics of coal.
MN832OE	Open Elective – III Health & Safety in Mines	At the end of this course, each student should be able to: CO1: Gain insights of safety management system and risk management in Indian mining industries. CO2: Formulate safety audits and control in mining industries. CO3: Produce risk analysis using statistical methods and analysis of mine accidents.


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PE831OE	Open Elective – III Disaster Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding Disasters, man-made Hazards and Vulnerabilities.</p> <p>CO2: Understanding disaster management mechanism.</p> <p>CO3: Understanding capacity building concepts and planning of disaster managements.</p>
PE832OE	Open Elective – III Fundamentals of Liquefied Natural Gas	<p>At the end of this course, each student should be able to:</p> <p>CO1: Have good knowledge on LNG process.</p> <p>CO2: Classify different liquefaction techniques.</p> <p>CO3: Understand different units in LNG processing and transportation.</p> <p>CO4: Have knowledge associated with safety aspects of LNG.</p>
PE833OE	Open Elective – III Health, Safety and Environment in Petroleum Industry	<p>At the end of this course, each student should be able to:</p> <p>CO1: The student can have the knowledge of various Acts related to safety, Health and environment in petroleum industry.</p> <p>CO2: The student can have the knowledge of various drilling fluids handling and safe disposal such toxic products.</p> <p>CO3: Knowledge of disaster management to fight any crisis.</p> <p>CO4: Knowledge of Hazard studies and occupational health hazards in the industry.</p>


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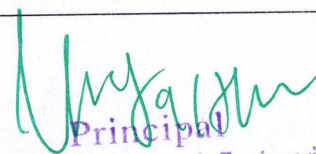
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Affiliated to Jawaharlal Nehru Technological University Hyderabad,
Approved by AICTE New Delhi

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE OUTCOMES (COs)

B.Tech. II Year I Sem. R18 Regulation Computer Science and Engineering

Course Code	Course Title / Name	Course Outcomes
CS301ES	Analog and Digital Electronics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know the characteristics of various components.</p> <p>CO2: Understand the utilization of components.</p> <p>CO3: Design and analyze small signal amplifier circuits.</p> <p>CO4: Learn Postulates of Boolean algebra and to minimize combinational functions</p> <p>CO5: Design and analyze combinational and sequential circuits</p> <p>CO6: Know about the logic families and realization of logic gates.</p>
CS302PC	Data Structures	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to select the data structures that efficiently model the information in a problem.</p> <p>CO2: Ability to assess efficiency trade-offs among different data structure implementations or combinations.</p> <p>CO3: Implement and know the application of algorithms for sorting and pattern matching.</p> <p>CO4: Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and AVL-trees.</p>



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MA303BS	Computer Oriented Statistical Methods	At the end of this course, each student should be able to: CO1: Apply the concepts of probability and distributions to some case studies CO2: Correlate the material of one unit to the material in other units CO3: Resolve the potential misconceptions and hazards in each topic of study.
CS304PC	Computer Organization and Architecture	At the end of this course, each student should be able to: CO1: Understand the basics of instructions sets and their impact on processor design. CO2: Demonstrate an understanding of the design of the functional units of a digital computer system. CO3: Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory. CO4: Design a pipeline for consistent execution of instructions with minimum hazards. CO5: Recognize and manipulate representations of numbers stored in digital computers.
CS305PC	Object Oriented Programming using C++	At the end of this course, each student should be able to: CO1: Able to develop programs with reusability. CO2: Develop programs for file handling. CO3: Handle exceptions in programming. CO4: Develop applications for a range of problems using object-oriented programming Techniques.
CS306ES	Analog and Digital Electronics Lab	At the end of this course, each student should be able to: CO1: Know the characteristics of various components. CO2: Understand the utilization of components. CO3: Design and analyze small signal amplifier circuits. CO4: Postulates of Boolean algebra and to minimize combinational functions CO5: Design and analyze combinational and sequential circuits CO6: Known about the logic families and realization of logic gates.


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CS307PC	Data Structures Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists.</p> <p>CO2: Ability to Implement searching and sorting Algorithms.</p>
CS308PC	IT Workshop Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify various hardware components of a System.</p> <p>CO2: Assemble the computer.</p> <p>CO3: Use various Microsoft tools.</p>
CS309PC	C++ Programming Lab	<p>At the end of this course, each student should be able to:</p> <p>Ability to develop applications for a range of problems using object-oriented programming techniques</p>
*MC309	Gender Sensitization Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students will have developed a better understanding of important issues related to gender in contemporary India.</p> <p>CO2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.</p> <p>CO3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it.</p> <p>CO4: Students will acquire insight into the gendered division of labour and its relation to politics and economics.</p> <p>CO5: Men and women students and professionals will be better equipped to work and live together as equals.</p> <p>CO6: Students will develop a sense of appreciation</p>


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		<p>of women in all walks of life.</p> <p>CO7: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.</p>
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B.Tech. II Year II Sem R18 Regulation Computer Science and Engineering

Course Code	Course Title / Name	Course Outcomes
CS401PC	Discrete Mathematics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to understand and construct precise mathematical proofs.</p> <p>CO2: Ability to use logic and set theory to formulate precise statements.</p> <p>CO3: Ability to analyze and solve counting problems on finite and discrete structures.</p> <p>CO4: Ability to describe and manipulate sequences.</p> <p>CO5: Ability to apply graph theory in solving computing problems.</p>
SM402MS	Business Economics & Financial Analysis	<p>At the end of this course, each student should be able to:</p> <p>The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.</p>
CS403PC	Operating Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Will be able to control access to a computer and the files that may be shared.</p> <p>CO2: Demonstrate the knowledge of the components of computer and their respective roles in computing.</p> <p>CO3: Ability to recognize and resolve user problems with standard operating environments.</p> <p>CO4: Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.</p>
CS404PC	Database Management Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Gain knowledge of fundamentals of DBMS,</p>

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		<p>database design and normal forms</p> <p>CO2: Master the basics of SQL for retrieval and management of data.</p> <p>CO3: Be acquainted with the basics of transaction processing and concurrency control.</p> <p>CO4: Familiarity with database storage structures and access techniques</p>
CS405PC	Java Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to solve real world problems using OOP techniques.</p> <p>CO2: Able to understand the use of abstract classes.</p> <p>CO3: Able to solve problems using java collection framework and I/o classes.</p> <p>CO4: Able to develop multithreaded applications with synchronization.</p> <p>CO5: Able to develop applets for web applications.</p> <p>CO6: Able to design GUI based applications.</p>
CS406PC	Operating Systems Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management.</p> <p>CO2: Able to implement C programs using Unix system calls.</p>
CS407PC	Database Management Systems Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design database schema for a given application and apply normalization</p> <p>CO2: Acquire skills in using SQL commands for data definition and data manipulation.</p> <p>CO3: Develop solutions for database applications using procedures, cursors and triggers</p>
CS408PC	Java Programming Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to write programs for solving real world problems using java collection frame work.</p> <p>CO2: Able to write programs using abstract classes.</p> <p>CO3: Able to write multithreaded programs.</p> <p>CO4: Able to write GUI programs using swing controls in Java.</p>


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*MC409	Constitution of India	<p>At the end of this course, each student should be able to:</p> <p>CO1 : Able to understand historical background of the constitutional making and its importance for building a democratic India, the structure of Indian government, the structure of state government, the local Administration.</p> <p>CO2: Able to apply the knowledge on directive principle of state policy, the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.</p> <p>CO3: Able to analyze the History, features of Indian constitution, the role Governor and Chief Minister, role of state election commission, the decentralization of power between central, state and local self-government.</p> <p>CO4: Able to evaluate Preamble, Fundamental Rights and Duties, Zilla Panchayat, block level organization, various commissions of viz SC/ST/OBC and women.</p>
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B.Tech. III Year I Sem R18 Regulation Computer Science and Engineering

Course Code	Course Title / Name	Course Outcomes
CS501PC	Formal Languages & Automata Theory	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to understand the concept of abstract machines and their power to recognize the languages.</p> <p>CO2: Able to employ finite state machines for modeling and solving computing problems.</p> <p>CO3: Able to design context free grammars for formal languages.</p> <p>CO4: Able to distinguish between decidability and undecidability.</p> <p>CO5: Able to gain proficiency with mathematical tools and formal methods.</p>



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CS502PC	Software Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to translate end-user requirements into system and software requirements, using e.g. UML, and structure the requirements in a Software Requirements Document (SRD).</p> <p>CO2: Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.</p> <p>CO3: Will have experience and/or awareness of testing problems and will be able to develop a simple testing report</p>
CS503PC	Computer Networks	<p>At the end of this course, each student should be able to:</p> <p>CO1: Gain the knowledge of the basic computer network technology.</p> <p>CO2: Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.</p> <p>CO3: Obtain the skills of subnetting and routing mechanisms.</p> <p>CO4: Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.</p>
CS504PC	Web Technologies	<p>At the end of this course, each student should be able to:</p> <p>CO1: gain knowledge of client-side scripting, validation of forms and AJAX programming.</p> <p>CO2: Understand server-side scripting with PHP Language.</p> <p>CO3: Understand what is XML and how to parse and use XML Data with Java.</p> <p>CO4: To introduce Server-side programming with Java Servlets and JSP.</p>
CS511PE	Professional Elective-I : Information Theory & Coding	<p>At the end of this course, each student should be able to:</p> <p>CO1: Learn measurement of information and errors.</p> <p>CO2: Obtain knowledge in designing various source codes and channel codes.</p> <p>CO3: Design encoders and decoders for block and cyclic codes.</p> <p>CO4: Understand the significance of codes in various applications.</p>

CS512PE	Professional Elective-I : Advanced Computer Architecture	<p>At the end of this course, each student should be able to:</p> <p>CO1: Computational models and Computer Architectures.</p> <p>CO2: Concepts of parallel computer models.</p> <p>CO3: Scalable Architectures, Pipelining, Superscalar processors, multiprocessors.</p>
CS513PE	Professional Elective-I : Data Analytics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the impact of data analytics for business decisions and strategy</p> <p>CO2: Carry out data analysis/statistical analysis</p> <p>CO3: To carry out standard data visualization and formal inference procedures.</p> <p>CO4: Design Data Architecture.</p> <p>CO5: Understand various Data Sources.</p>
CS514PE	Professional Elective-I : Image Processing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.</p>
		<p>CO2: Demonstrate the knowledge of filtering techniques.</p> <p>CO3: Demonstrate the knowledge of 2D transformation techniques.</p> <p>CO4: Demonstrate the knowledge of image enhancement, segmentation, restoration and compression techniques.</p>
CS515PE	Professional Elective-I : Principles of Programming Languages	<p>At the end of this course, each student should be able to:</p> <p>CO1: Acquire the skills for expressing syntax and semantics in formal notation.</p> <p>CO2: Identify and apply a suitable programming paradigm for a given computing application.</p> <p>CO3: Gain knowledge of and able to compare the features of various programming languages.</p>


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CS521PE	Professional Elective –II: Computer Graphics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Acquire familiarity with the relevant mathematics of computer graphics.</p> <p>CO2: Be able to design basic graphics application programs, including animation</p> <p>CO3: Be able to design applications that display graphic images to given specifications</p>
CS522PE	Professional Elective –II: Advanced Operating Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the design approaches of advanced operating systems.</p> <p>CO2: Analyze the design issues of distributed operating systems.</p> <p>CO3: Evaluate design issues of multi processor operating systems.</p> <p>CO4: Identify the requirements Distributed File System and Distributed Shared Memory.</p> <p>CO5: Formulate the solutions to schedule the real time applications.</p>
CS523PE	Professional Elective –II: Informational Retrieval Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to apply IR principles to locate relevant information large collections of data.</p> <p>CO2: Ability to design different document</p>
		<p>clustering algorithms.</p> <p>CO3: Implement retrieval systems for web search tasks.</p> <p>CO4: Design an Information Retrieval System for web search tasks.</p>
CS524PE	Professional Elective –II: Distributed Databases	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand theoretical and practical aspects of distributed database systems.</p> <p>CO2: Study and identify various issues related to the development of distributed database system.</p> <p>CO3: Understand the design aspects of object-oriented database system and related development.</p>


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CS525PE	Professional Elective –II: Natural Language Processing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Show sensitivity to linguistic phenomena and an ability to model them with formal grammars.</p> <p>CO2: Understand and carry out proper experimental methodology for training and evaluating empirical NLP systems.</p> <p>CO3: Able to manipulate probabilities, construct statistical models over strings and trees, and estimate parameters using supervised and unsupervised training methods.</p> <p>CO4: Able to design, implement, and analyze NLP Algorithms.</p> <p>CO5: Able to design different language modeling Techniques.</p>
CS505PC	Software Engineering Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to translate end-user requirements into system and software requirements.</p> <p>CO2: Ability to generate a high-level design of the system from the software requirements.</p> <p>CO3: Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.</p>
CS506PC	Computer Networks & Web Technologies Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Implement data link layer framing methods.</p> <p>CO2: Analyze error detection and error correction codes.</p> <p>CO3: Implement and analyze routing and congestion issues in network design.</p> <p>CO4: Implement Encoding and Decoding techniques used in presentation layer.</p> <p>CO5: To be able to work with different network Tools.</p>


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EN508HS	Advanced Communication Skills Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: To improve fluency in English through a well developed vocabulary and enable them to listen at normal conversational speed by educated English speakers and respond appropriately in different socio cultural and professional context.</p> <p>CO2: Further, they would be required to communicate their ideas relevantly and coherently in writing .</p> <p>CO3: To prepare all the students for their Placements.</p> <p>CO4: Learn to overcome stage fear and make presentations with ease.</p> <p>CO5: Learn how to pronounce words using the rules they have been taught.</p>
*MC510	Intellectual Property Rights	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify different types of Intellectual Properties (IPs), the right of ownership, scope of protection as well as the ways to create and to extract value from IP.</p> <p>CO2: Recognize the crucial role of IP in organizations of different industrial sectors for the purposes of product and technology development.</p> <p>CO3: Identify activities and constitute IP infringements and the remedies available to the IP owner and describe the precautions steps to be taken to prevent infringement of proprietary rights in products and technology development.</p> <p>CO4: Be familiar with the processes of Intellectual</p>

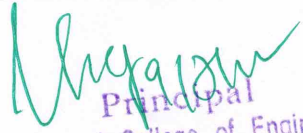

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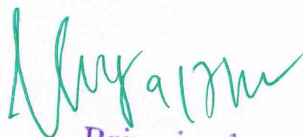
		<p>Property Management (IPM) and various approaches for IPM and conducting IP and IPM auditing and explain how IP can be managed as a strategic resource and suggest IPM strategy.</p> <p>CO5: Be able to anticipate and subject to critical analysis arguments relating to the development and reform of intellectual property right institutions and their likely impact on creativity and innovation.</p> <p>CO6: Be able to demonstrate a capacity to identify, apply and assess ownership rights and marketing protection under intellectual property law as applicable to information, ideas, new products and product marketing;</p>
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Course Code	Course Title / Name	Course Outcomes
CS601PC	Machine Learning	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the concepts of computational intelligence like machine learning .</p> <p>CO2: Ability to get the skill to apply machine learning techniques to address the real time problems in different areas.</p> <p>CO3: Understand the Neural Networks and its usage in machine learning application.</p>
CS502PC	Compiler Design	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate the ability to design a compiler given a set of language features.</p> <p>CO2: Demonstrate the knowledge of patterns, tokens & regular expressions for lexical analysis.</p> <p>CO3: Acquire skills in using lex tool & yacc tool for developing a scanner and parser.</p> <p>CO4: Design and implement LL and LR parsers.</p> <p>CO5: Design algorithms to do code optimization in order to improve the performance of a program in terms of space and time complexity.</p> <p>CO6: Design algorithms to generate machine code.</p>


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CS503PC	Design and Analysis of Algorithms	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to analyze the performance of algorithms</p> <p>CO2: Ability to choose appropriate data structures and algorithm design methods for a specified application.</p> <p>CO3: Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.</p>
CS611PE	Professional Elective-III : Concurrent Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to implement the mechanisms for communication and co-ordination among concurrent processes.</p> <p>CO2: Ability to understand and reason about concurrency and concurrent objects.</p> <p>CO3: Ability to implement the locking and non-blocking mechanisms .</p> <p>CO4: Ability to understand concurrent objects.</p>
CS612PE	Professional Elective-III : Network Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: To write socket API based programs .</p> <p>CO2: To design and implement client-server applications using TCP and UDP sockets.</p> <p>CO3: To analyze network programs.</p>
CS613PE	Professional Elective-III : Scripting Languages	<p>At the end of this course, each student should be able to:</p> <p>CO1: Comprehend the differences between typical scripting languages and typical system and application programming languages.</p> <p>CO2: Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.</p> <p>CO3: Acquire programming skills in scripting Language.</p>


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CS614PE	Professional Elective-III : Mobile Application Development	<p>At the end of this course, each student should be able to:</p> <p>CO1: Student understands the working of AndroidOS Practically.</p> <p>CO2: Student will be able to develop Android user Interfaces.</p> <p>CO3: Student will be able to develop, deploy and maintain the Android Applications.</p>
CS615PE	Professional Elective-III : Software Testing Methodologies	<p>At the end of this course, each student should be able to:</p> <p>Design and develop the best test strategies in accordance to the development model.</p>
	Open Elective-I	
CS604PC	Machine Learning Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand complexity of Machine Learning algorithms and their limitations.</p>
		<p>CO2: Understand modern notions in data analysis-oriented computing.</p> <p>CO3: Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own.</p> <p>CO4: Be capable of performing experiments in Machine Learning using real-world data.</p>
CS605PC	Compiler Design Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML.</p> <p>CO2: Apply client-server principles to develop scalable and enterprise web applications.</p> <p>CO3: Ability to design, develop, and implement a compiler for any language.</p> <p>CO4: Able to use lex and yacc tools for developing a scanner and a parser.</p> <p>CO5: Able to design and implement LL and LR parsers.</p>
CS611PE	Professional Elective-III Lab: Concurrent Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: The conceptual foundations of concurrent programming.</p> <p>CO2: A variety of effective ways of structuring concurrent and distributed programs.</p>

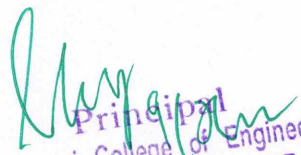
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CS612PE	Professional Elective-III Lab: Network Programming	At the end of this course, each student should be able to: CO1: To write socket API based programs. CO2: To design and implement client-server applications using TCP and UDP sockets . CO3: To analyze network programs.
CS613PE	Professional Elective-III Lab : Scripting Languages	At the end of this course, each student should be able to: CO1: Ability to understand the differences between Scripting languages and programming languages CO2: Able to gain some fluency programming in Ruby, Perl, TCL.
CS614PE	Professional Elective-III Lab: Mobile Application	At the end of this course, each student should be able to: CO1: Student understands the working of Android OS Practically.
	Development	CO2: Student will be able to develop user interfaces. CO3: Student will be able to develop, deploy and maintain the Android Applications.
CS615PE	Professional Elective-III Lab : Software Testing Methodologies	At the end of this course, each student should be able to: Design and develop the best test strategies in accordance to the development model.
*MC609	Environmental Science	At the end of this course, each student should be able to: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

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Course Code	Course Title / Name	Course Outcomes
CS701PC	Data Mining	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to perform the preprocessing of data and apply mining techniques on it.</p> <p>CO2: Ability to identify the association rules, classification and clusters in large data sets.</p> <p>CO3: Ability to solve real world problems in business and scientific information using data mining</p> <p>CO4: Ability to classify web pages, extracting knowledge from the web</p>
CS702PC	Principles of Programming Languages	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to express syntax and semantics in formal notation.</p> <p>CO2: Ability to apply suitable programming paradigm for the application.</p> <p>CO3: Ability to compare the features of various programming languages.</p> <p>CO4: Able to understand the programming paradigms of modern programming languages.</p> <p>CO5: Able to understand the concepts of ADT and OOP.</p> <p>CO6: Ability to program in different language paradigms and evaluate their relative benefits.</p>
CS721PE	Professional Elective – II Python Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.</p> <p>CO2: Demonstrate proficiency in handling Strings and File Systems.</p> <p>CO3: Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.</p> <p>CO4: Interpret the concepts of Object-Oriented Programming as used in Python.</p> <p>CO5: Implement exemplary applications related to Network Programming, Web Services and Databases in Python.</p>


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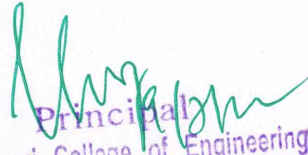
CS722PE	Professional Elective– II Mobile Application Development	<p>At the end of this course, each student should be able to:</p> <p>CO1: Describe Android platform, Architecture and features.</p> <p>CO2: Design User Interface and develop activity for Android App.</p> <p>CO3: Use Intent , Broadcast receivers and Intentservices in Android App.</p> <p>CO4: Design and implement Database Application and Content providers.</p> <p>CO5: Use multimedia, camera and Location basedservices in Android App.</p> <p>CO6: Discuss various security issues in Android Platform.</p>
CS723PE	Professional Elective– II Web Scripting Languages	<p>At the end of this course, each student should be able to:</p> <p>CO1: Comprehend the differences between typical scripting languages and typical system and application programming languages.</p> <p>CO2: Gain knowledge of the strengths and weakness of Perl, TCL and Ruby; and select an appropriate language for solving a given problem.</p> <p>CO3: Acquire programming skills in scripting language.</p>
CS724PE	Professional Elective– II Internet of Things	<p>At the end of this course, each student should be able to:</p> <p>CO1: Interpret the impact and challenges posed byIoT networks leading to new architectural models.</p> <p>CO2: Compare and contrast the deployment of smart objects and the technologies to connect them to network.</p> <p>CO3: Appraise the role of IoT protocols for efficient network communication.</p> <p>CO4: Elaborate the need for Data Analytics and Security in IoT.</p> <p>CO5: Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.</p>

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CS731PE	Professional Elective-III Graph Theory	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know some important classes of graph theoretic problems;</p> <p>CO2: Be able to formulate and prove central theorems about trees, matching, connectivity, colouring and planar graphs;</p> <p>CO3: Be able to describe and apply some basic algorithms for graphs;</p> <p>CO4: Be able to use graph theory as a modelling tool.</p>
CS732PE	Professional Elective-III Distributed Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Able to comprehend and design a new distributed system with the desired features.</p> <p>CO2: Able to start literature survey leading to further research in any subarea.</p> <p>CO3: Able to develop new distributed applications.</p>
CS733PE	Professional Elective-III Machine Learning	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the concepts of computational intelligence like machine learning</p> <p>CO2: Ability to get the skill to apply machine learning techniques to address the real time problems in different areas</p> <p>CO3: Understand the Neural Networks and its usage in machine learning application.</p>
CS734PE	Professional Elective-III Software Process and Project Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Gain knowledge of software economics, phases in the life cycle of software development, project organization, project control and process instrumentation</p> <p>CO2: Analyze the major and minor milestones, artifacts and metrics from management and technical perspective</p> <p>CO3: Design and develop software product using conventional and modern principles of software project management</p>
CS741PE	Professional Elective-IV Computational Complexity	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to classify decision problems into appropriate complexity classes</p>

		<p>CO2: Ability to specify what it means to reduce one problem to another, and construct reductions for simple examples.</p> <p>CO3: Ability to classify optimization problems into appropriate approximation complexity classes</p> <p>CO4: Ability to choose appropriate data structure for the given problem</p> <p>CO5: Ability to choose and apply appropriate design method for the given problem</p>
CS742PE	Professional Elective-IV Cloud Computing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to understand various service delivery models of a cloud computing architecture.</p> <p>CO2: Ability to understand the ways in which the cloud can be programmed and deployed.</p> <p>CO3: Understanding cloud service providers.</p>
CS743PE	Professional Elective-IV Blockchain Technology	<p>At the end of this course, each student should be able to:</p> <p>Learn about research advances related to one of the most popular technological areas today</p>
CS744PE	Professional Elective-IV Social Network Analysis	<p>At the end of this course, each student should be able to:</p> <p>CO1: Develop semantic web related applications.</p> <p>CO2: Represent knowledge using ontology.</p> <p>CO3: Predict human behaviour in social web and related communities.</p> <p>CO4: Visualize social networks</p>
CS703PC	Data Mining Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to add mining algorithms as a component to the existing tools</p> <p>CO2: Ability to apply mining techniques for realistic data.</p>
CS751PC	Professional Elective -II Python Programming Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Student should be able to understand the basic concepts scripting and the contributions of scripting language</p> <p>CO2: Ability to explore python especially the object oriented concepts, and the built in objects of Python.</p> <p>CO3: Ability to create practical and contemporary</p>


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		applications such as TCP/IP network programming, Web applications, discrete event simulations
CS752PC	Professional Elective -II Mobile Application Development Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate the android features and create , develop using android.</p> <p>CO2: Demonstrate and Understanding anatomy of an Android application</p> <p>CO3: Apply the android geo location based services.</p> <p>CO4: Illustrate the android wifi features and advance android development.</p> <p>CO5: Demonstrate the linux security and implement ADL interface</p>
CS753PC	Professional Elective -II Web Scripting Languages Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to understand the differences between Scripting languages and programming languages</p> <p>CO2: Able to gain some fluency programming in Ruby, Perl, TCL.</p>
CS754PC	Professional Elective -II Internet of Things Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Investigate a variety of emerging devices and technologies such as smart sensing, pervasive connectivity, virtual interfaces & ubiquitous computing and their potential applications in consumer, retail, healthcare and industrial contexts</p> <p>CO2: Collaborate on research with industry partners to address significant and complex challenges surrounding IoT technologies and applications</p> <p>CO3: This may be used as a platform for conducting consultancy work required by government/Private organizations in around Coimbatore.</p> <p>CO4: Enable faculty learning, research and hands-on experimentation to discover and demonstrate the promise of the Internet of Things.</p> <p>CO5: Provide students unique interdisciplinary learning and innovation experiences with IoT technologies.</p>

CS705PC	Industry Oriented Mini Project	At the end of this course, each student should be able to: CO1: Formulate a real world problem and develop its requirements CO2: Student will be exposed to industrial awareness CO3: Self learning technologies, methods and/or techniques that contribute to the software solution of the project.
CS706PC	Seminar	At the end of this course, each student should be able to: CO1: Ability to work in actual working environment. CO2: Ability to utilize technical resources CO3: Ability to write technical documents and give oral presentations related to the work completed.

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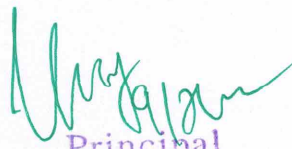
Course Code	Course Title / Name	Course Outcomes
	Open Elective – III	
CS851PE	Professional Elective – V Information Theory & Coding	At the end of this course, each student should be able to: CO1: Learn measurement of information and errors. CO2: Obtain knowledge in designing various source codes and channel codes. CO3: Design encoders and decoders for block and cyclic codes. CO4: Understand the significance of codes in various applications.



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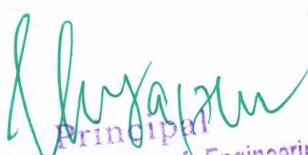
CS852PE	Professional Elective – V Real-Time Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to explain real-time concepts such as preemptive multitasking, task priorities.</p> <p>CO2: Priority inversions, mutual exclusion, context switching, and synchronization, interrupt.</p> <p>CO3: Latency and response time, and semaphores.</p> <p>CO4: Able describe how a real-time operating system kernel is implemented.</p> <p>CO5: Able explain how tasks are managed.</p> <p>CO6: Explain how the real-time operating system implements time management.</p> <p>CO7: Discuss how tasks can communicate using semaphores, mailboxes, and queues.</p> <p>CO8: Be able to implement a real-time system on an embedded processor.</p> <p>CO9: Be able to work with real time operating systems like RT Linux, Vx Works, MicroC /OSII, Tiny OS.</p>
CS853PE	Professional Elective – V Data Analytics	<p>At the end of this course, each student should be able to:</p> <p>CO1: After completion of this course students will be able to Understand the impact of data analytic for business decisions and strategy.</p> <p>CO2: Carry out data analysis/statistical analysis</p> <p>CO3: To carry out standard data visualization and formal inference procedures.</p>
		<p>CO4: Design Data Architecture.</p> <p>CO5: Understand various Data Sources.</p>
CS854PE	Professional Elective – V Modern Software Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Basic knowledge and understanding of the analysis and design of complex systems.</p> <p>CO2: Ability to apply software engineering principles and techniques.</p>
CS861PE	Professional Elective -VI Advanced Algorithms	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to analyze the performance of algorithms.</p> <p>CO2: Ability to choose appropriate data structures and algorithm design methods for a specified application.</p> <p>CO3: Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.</p>

CS862PE	Professional Elective -VI Web Services and Service Oriented Architecture	At the end of this course, each student should be able to: CO1: Basic details of WSDL, UDDI, SOAP CO2: Implement WS client and server with interoperable systems
CS863PE	Professional Elective -VI Computer Forensics	At the end of this course, each student should be able to: CO1: Students will understand the usage of computers in forensic, and how to use various forensic tools for a wide variety of investigations. CO2: It gives an opportunity to students to continue their zeal in research in computer forensics
CS864PE	Professional Elective -VI Neural Networks and Deep Learning	At the end of this course, each student should be able to: CO1: Ability to understand the concepts of Neural Networks. CO2: Ability to select the Learning Networks in modeling real world systems CO3: Ability to use an efficient algorithm for Deep Models. CO4: Ability to apply optimization strategies for large scale applications.
CS801PC	Major Project	At the end of this course, each student should be able to: CO1: Ability to implement and execute well defined objective CO2: Ability to work in team at component level and system level CO3: Ability to troubleshoot.

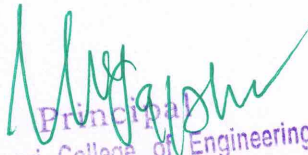

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Open Elective –I
(Common for EEE, ECE, CSE, IT, ME)


Course Code	Course Title / Name	Course Outcomes
CE600OE	Open Elective –I Disaster Preparedness & Planning Management	At the end of this course, each student should be able to: CO1: The application of Disaster Concepts to Management CO2: Analyzing Relationship between Development and Disasters. CO3: Ability to understand Categories of Disasters CO4: Realization of the responsibilities to society
CS600OE	Open Elective –I Entrepreneurship	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.
CS601OE	Open Elective –I Fundamentals of Management for Engineers	At the end of this course, each student should be able to: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.
CS602OE	Open Elective –I Cyber Law & Ethics	At the end of this course, each student should be able to: CO1: The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers. CO2: The students will learn the rights and responsibilities as an employee, team member and a global citizen
EC600OE	Open Elective –I Fundamentals of Internet of Things	At the end of this course, each student should be able to: CO1: Known basic protocols in sensor networks. CO2: Program and configure Arduino boards for various designs. CO3: Python programming and interfacing for


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		Raspberry Pi. CO4: Design IoT applications in different domains
EI600OE	Open Elective –I Basics Of Sensors Technology	At the end of this course, each student should be able to: CO1: Identify suitable sensors and transducers for real time applications. CO2: Translate theoretical concepts into working models. CO3: Design the experimental applications to engineering modules and practices. CO4: Design engineering solution to the Industry/Society needs and develop products.
EE600OE	Open Elective –I Reliability Engineering	At the end of this course, each student should be able to: CO1: Model various systems applying reliability networks CO2: Evaluate the reliability of simple and complex systems CO3: Estimate the limiting state probabilities of repairable systems CO4: Apply various mathematical models for evaluating reliability of irreparable systems
EE601OE	Open Elective –I Renewable Energy Sources	At the end of this course, each student should be able to: CO1: Understand the principles of wind power and solar photovoltaic power generation, fuel cells. CO2: Assess the cost of generation for conventional and renewable energy plants CO3: Design suitable power controller for wind and solar applications CO4: Analyze the issues involved in the integration of renewable energy sources to the grid
ME600OE	Open Elective –I Quantitative Analysis for Business Decisions	At the end of this course, each student should be able to: CO1: Familiar with issues that would crop up in business CO2: Able to formulate Mathematical Model to resolve the issue CO3: Able to select technique for solving the formulated Mathematical Model CO4: Able to analyze the results obtained through the selected technique for implementation.


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MT600OE	Open Elective –I Industrial Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Choose, prepare, interpret and use cost estimates as a basis for the different situations in an industrial company.</p> <p>CO2: Interpret financial statements and other financial reports of industrial companies, including the income statement, the balance sheet, the cash flow statement and key measures.</p> <p>CO3: Explain how strategic planning, management, management control, entrepreneurship, organization, production and learning works in an industrial company.</p> <p>CO4: Explain how the industrial company markets and price its products.</p> <p>CO5: Explain how the company deals with its environment.</p>
MT601OE	Open Elective –I Non-Conventional Energy Sources	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells.</p> <p>CO2: Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation.</p> <p>CO3: Explore the concepts involved in wind energy conversion system by studying its components, types and performance.</p> <p>CO4: Illustrate ocean energy and explain the operational methods of their utilization.</p> <p>CO5: Acquire the knowledge on Geothermal energy.</p>
PE600OE	Open Elective –I General Geology	<p>At the end of this course, each student should be able to:</p> <p>The student would understand the basics of geology, viz: formation of earth, layers of earth, different types of rocks, formation of sedimentary basins and the microfossils and their relationship to oil and gas.</p>

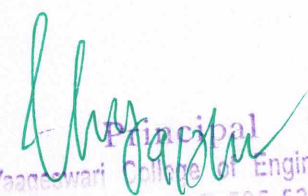

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MM600OE	Open Elective –I Testing of Materials	At the end of this course, each student should be able to: CO1: Classify mechanical testing of ferrous and non-ferrous metals and alloys. CO2: Recognize the importance of crystal defects including dislocations in plastic deformation. CO3: Identify the testing methods for obtaining strength and hardness. CO4: Examine the mechanisms of materials failure through fatigue and creep
MM601OE	Open Elective –I Alloy Steels	At the end of this course, each student should be able to: CO1: Ability to understand different types of alloys used in alloy steels. CO2: Ability to solve different metallurgical problems in alloy steels. CO3: It has a lot of scope in R&D and in automobile engineering.
MN600OE	Open Elective –I Introduction to Mining Technology	At the end of this course, each student should be able to: Upon completion of the course, the student shall be able to understand various stages in the life of the mine, drilling, blasting and shaft sinking.
MN601OE	Open Elective –I Coal Gasification, CBM & Shale Gas	At the end of this course, each student should be able to: Student can get specialized in the underground coal gasification concepts, application and future scope in various geominning conditions.

Open Elective –III

(Common for EEE, ECE, CSE, IT, ME)

Course Code	Course Title / Name	Course Outcomes
AE831OE	Open Elective – III Air Transportation Systems	At the end of this course, each student should be able to: CO1: Explain the air transport systems. CO2: Describe the aircraft characteristics, airlines and airport operation. CO3: Apply the Air Navigation System & Environmental Systems.


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AE832OE	Open Elective – III Rockets and Missiles	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design a preliminary chemical rocket engine</p> <p>CO2: Compute various types of aerodynamic forces acting on the rocket and missile during the flight.</p> <p>CO3: Determine the various equations of motion used in rocket and missile technology</p> <p>CO4: Illustrate staging of rockets and its performance estimation.</p> <p>CO5: Judge the materials for rocket and missile components.</p>
AM831OE	Open Elective – III Introduction to Mechatronics	<p>At the end of this course, each student should be able to:</p> <p>At the end of the course, the student will be able to, Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product. Develop PLC programs for a given task. Evaluate the performance of mechatronic systems.</p>
AM832OE	Open Elective – III Microprocessors and Microcontrollers	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands the internal architecture and organization of 8086, 8051 and ARM processors / controllers.</p> <p>CO2: Understands the interfacing techniques to</p>
		8086 and 8051 and can develop assembly language programming to design microprocessor / micro controller based systems.
BM831OE	Open Elective – III Telemetry and Telecontrol	<p>At the end of this course, each student should be able to:</p> <p>Upon completion of this course students will appreciate the application of different telemetry systems and control to any process.</p>


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BM832OE	Open Elective – III Electromagnetic Interference and Compatibility	<p>At the end of this course, each student should be able to:</p> <p>CO1: Gain basic knowledge of problems associated with EMI and EMC from electronic circuits and systems.</p> <p>CO2: Analyze various sources of EMI and various possibilities to provide EMC.</p> <p>CO3: Understand and analyze possible EMI revention techniques such as grounding, shielding, filtering, and use of proper coupling mechanisms to improve compatibility of electronic circuits and systems in a given electromagnetic environment.</p>
CE831OE	Open Elective – III Environmental Impact Assessment	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the environmental attributes to be considered for the EIA study.</p> <p>CO2: Formulate objectives of the EIA studies.</p> <p>CO3: Identify the suitable methodology and prepare Rapid EIA.</p> <p>CO4: Indentify and incorporate mitigation measures.</p>
CE832OE	Open Elective – III Optimization Techniques in Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Formulate optimization problem.</p> <p>CO2: Solve the problem by using a appropriate optimization techniques.</p>
CE833OE	Open Elective – III Entrepreneurship and Small Business Enterprises	<p>At the end of this course, each student should be able to:</p> <p>It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.</p>

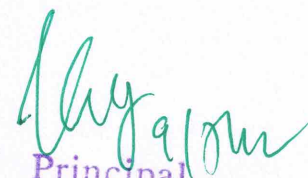

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CN831OE	Open Elective – III Remote Sensing and GIS	<p>At the end of this course, each student should be able to:</p> <p>CO1: Retrieve the information content of remotely sensed data.</p> <p>CO2: Analyze the energy interactions in the atmosphere and earth surface features.</p> <p>CO3: Interpret the images for preparation of thematic maps.</p> <p>CO4: Apply problem specific remote sensing data for engineering applications.</p> <p>CO5: Analyze spatial and attribute data for solving spatial problems.</p> <p>CO6: Create GIS and cartographic outputs for presentation.</p>
CS831OE	Open Elective – III Linux Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Work confidently in Linux environment.</p> <p>CO2: Work with shell script to automate different tasks as Linux administration.</p>
CS832OE	Open Elective – III R Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to use and program in the Programming language R.</p> <p>CO2: Be able to use R to solve statistical problems.</p> <p>CO3: Be able to implement and describe Monte Carlo the technology.</p> <p>CO4: Be able to minimize and maximize functions using R.</p>
CS833OE	Open Elective – III PHP Programming	<p>At the end of this course, each student should be able to:</p> <p>CO1: Be able to develop a form containing several fields and be able to process the data provided on the form by a user in a PHP- based script.</p> <p>CO2: Understand basic PHP syntax for variable use and standard language constructs, such as conditionals and loops.</p> <p>CO3: Understand the syntax and use of PHP object-oriented classes.</p> <p>CO4: Understand the syntax and functions available to deal with file processing for files on the server as well as processing web URLs.</p>

		<p>CO5: Understand the paradigm for dealing with form-based data, both from the syntax of HTML forms, and how they are accessed inside a PHP-based script.</p>
EC831OE	<p>Open Elective – III Electronic Measuring Instruments</p>	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify the various electronic instruments based on their specifications for carrying out a particular task of measurement.</p> <p>CO2: Measure various physical parameters by appropriately selecting the transducers.</p> <p>CO3: Use various types of signal generators, signal analyzers for generating and analyzing various real-time signals.</p>
EM831OE	<p>Open Elective – III Data Analytics</p>	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the impact of data analytics for business decisions and strategy.</p> <p>CO2: Carry out data analysis/statistical analysis</p> <p>CO3: To carry out standard data visualization and formal inference procedures.</p> <p>CO4: Design Data Architecture</p> <p>CO5: Understand various Data Sources.</p>
EE831OE	<p>Open Elective – III Entrepreneur Resource Planning</p>	<p>At the end of this course, each student should be able to:</p> <p>ERP System Implementation options, and functional modules of ERP.</p> <p>CO1: Introduction to ERP- Foundation for Understanding ERP systems-Business benefits of ERP-The challenges of implementing ERP system-ERP modules and Historical Development.</p> <p>Case: Response to RFP for ERP system (Mary Sumner).</p> <p>CO2: ERP system options & Selection methods- Measurement of project Impact- information Technology Selection-ERP proposal evaluation-Project Evaluation Technique.</p> <p>Case: Atlantic Manufacturing (Mary Sumner).</p> <p>CO3: ERP system Installation Options- IS/IT Management results-Risk Identification analysis-System Projects- Demonstration of</p>

		<p>the system-Failure method-system Architecture & ERP (David L. Olson)</p> <p>Case: Data Solutions & Technology Knowledge (Mary Sumner).</p> <p>CO4: ERP - sales and Marketing- Management control process in sales and marketing – ERP customer relationship management - ERP systems- Accounting & Finance control processes. Financial modules in ERP systems.</p> <p>Case: Atlantic manufacturing (Mary Sumner).</p> <p>CO5: ERP – Production and Material Management- Control process on production and manufacturing - Production module in ERP- supply chain Management & e-market place-e-business & ERP-e supply chain & ERP- Future directions for ERP.</p> <p>Case: HR in Atlantic manufacturing. (Mary Sumner).</p>
EE832OE	Open Elective – III Management Information Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the usage of MIS in organizations and the constituents of the MIS.</p> <p>CO2: Understand the classifications of MIS, understanding of functional MIS and the different functionalities of these MIS. This would be followed by case study on Knowledge management.</p> <p>CO3: Assess the requirement and stage in which the organization is placed. Nolan model is expected to aid such decisions.</p> <p>CO4: Learn the functions and issues at each stage of system development. Further different ways in which systems can be developed are also learnt.</p>
EE833OE	Open Elective – III Organizational Behaviour	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyse the behaviour of individuals and groups in organizations in terms of the key factors that influence organizational behaviour.</p> <p>CO2: Assess the potential effects of organizational level factors (such as structure, culture and change) on organizational behaviour.</p>


		<p>CO3: Critically evaluate the potential effects of important developments in the external environment (such as globalization and advances in technology) on organizational behaviour.</p> <p>CO4: Analyse organizational behavioural issues in the context of organizational behaviour theories, models and concepts.</p>
EI831OE	Open Elective – III Sensors and Transducers,	<p>At the end of this course, each student should be able to:</p> <p>Upon completion of this course the student shall be able to understand the working of basic sensors and transducers used in any industries.</p>
EI832OE	Open Elective – III PC Based Instrumentation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understands measurement and analyzing techniques of digital computer power and performance .</p> <p>CO2: Understands the various types of interfacing systems and components.</p> <p>CO3: Develops the knowledge of real-time systems and case studies in instrumentation .</p> <p>CO4: Capability to analyze PC based data .</p> <p>CO5: Capable to develop instrumentation systems on various processes of industrial measurements.</p>
ME831OE	Open Elective – III Total Quality Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Evaluate the principles of quality management and to explain how these principles can be applied within quality management systems.</p> <p>CO2: Identify the key aspects of the quality improvement cycle and to select and use appropriate tools and techniques for controlling, improving and measuring quality.</p> <p>CO3: Critically appraise the organisational, communication and teamwork requirements for effective quality management .</p> <p>CO4: Critically analyse the strategic issues in quality management, including current issues and developments, and to devise and evaluate</p>


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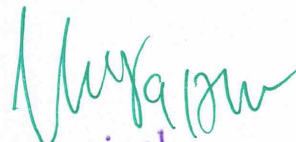
		quality implementation plans.
ME832OE	Open Elective – III Industrial Safety, Health, and Environmental Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: To list out important legislations related to Health , Safety and Environment</p> <p>CO2: To list out requirements mentioned in factories act for the prevention of accidents. To understand the health and welfare provisions given in factories act.</p> <p>CO3: To understand the statutory requirements for an Industry on registration, license and its renewal.</p> <p>CO4: To prepare onsite and offsite emergency plan.</p>
ME833OE	Open Elective – III Basics of Thermodynamics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand and differentiate between different thermodynamic systems and processes.</p> <p>CO2: Understand and apply the laws of Thermodynamics to different types of system undergoing various processes.</p> <p>CO3: Understand and analyze the Thermodynamic Cycles.</p>
ME834OE	Open Elective – III Reliability Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Model various systems applying reliability networks.</p> <p>CO2: Evaluate the reliability of simple and complex systems.</p> <p>CO3: Estimate the limiting state probabilities of repairable systems.</p> <p>CO4: Apply various mathematical models for evaluating reliability of irreparable systems.</p>
NT831OE	Open Elective – III Concepts of Nano Science And Technology	<p>At the end of this course, each student should be able to:</p> <p>The intended course covers the whole spectrum of nanomaterials ranging from introduction, classification, synthesis, properties, and characterization tools of nanophase materials to application including some new developments in various aspects.</p>

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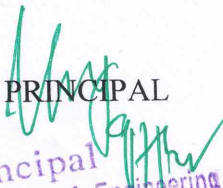
NT832OE	Open Elective – III Synthesis of Nanomaterials	At the end of this course, each student should be able to: To provide abundant knowledge on various synthesis methods of nanomaterials.
NT833OE	Open Elective – III Characterization of Nanomaterials	At the end of this course, each student should be able to: CO1: The student will develop a fundamental knowledge of nanomaterials. . CO2: The student will demonstrate an understanding of the properties of materials with strong dependence on size. CO3: The student will demonstrate an understanding of approaches to nanomaterials characterization.
MT831OE	Open Elective – III Renewable Energy Sources	At the end of this course, each student should be able to: CO1: Understanding of renewable energy sources. CO2: Knowledge of working principle of various energy systems. CO3: Capability to carry out basic design of renewable energy systems.
MT832OE	Open Elective – III Production Planning and Control	At the end of this course, each student should be able to: At the end of the course, the student will be able to, Understand production systems and their characteristics. Evaluate MRP and JIT systems against traditional inventory control systems. Understand basics of variability and its role in the performance of a production system. Analyze aggregate planning strategies. Apply forecasting and scheduling techniques to production systems. Understand theory of constraints for effective management of production systems.
MT833OE	Open Elective – III Entrepreneurship and Small Business Enterprises	At the end of this course, each student should be able to: It enables students to learn the basics of Entrepreneurship and entrepreneurial development

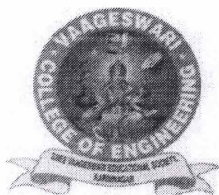

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		which will help them to provide vision for their own Start-up.
MM831OE	Open Elective – III Design and Selection of Engineering Materials	At the end of this course, each student should be able to: Understand the Relationship between materials selection, processing and applications.
MN831OE	Open Elective – III Solid Fuel Technology	At the end of this course, each student should be able to: Students can understand the fundamentals of Processes of formation of coal, properties and evaluation and coal preparation and washability characteristics of coal.
MN832OE	Open Elective – III Health & Safety in Mines	At the end of this course, each student should be able to: CO1: Gain insights of safety management system and risk management in Indian mining industries. CO2: Formulate safety audits and control in mining industries. CO3: Produce risk analysis using statistical methods and analysis of mine accidents.
PE831OE	Open Elective – III Disaster Management	At the end of this course, each student should be able to: CO1: Understanding Disasters, man-made Hazards and Vulnerabilities. CO2: Understanding disaster management mechanism. CO3: Understanding capacity building concepts and planning of disaster managements.
PE832OE	Open Elective – III Fundamentals of Liquefied Natural Gas	At the end of this course, each student should be able to: CO1: Have good knowledge on LNG process. CO2: Classify different liquefaction techniques. CO3: Understand different units in LNG processing and transportation. CO4: Have knowledge associated with safety aspects of LNG.


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PE833OE	Open Elective – III Health, Safety and Environment in Petroleum Industry	<p>At the end of this course, each student should be able to:</p> <p>CO1: The student can have the knowledge of various Acts related to safety, Health and environment in petroleum industry.</p> <p>CO2: The student can have the knowledge of various drilling fluids handling and safe disposal such toxic products.</p> <p>CO3: Knowledge of disaster management to fight any crisis.</p> <p>CO4: Knowledge of Hazard studies and occupational health hazards in the industry.</p>
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VAAGESWARI COLLEGE OF ENGINEERING

Beside LMD Police Station, Ramakrishna Colony,
KARIMNAGAR, Telangana state – 505 527
Affiliated to Jawaharlal Nehru Technological University Hyderabad,
Approved by AICTE New Delhi

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE OUTCOMES (COs)

M.Tech. I Year I Sem R19 Regulation Computer Science and Engineering

Course Code	Course Title / Name	Course Outcomes
Professional Core - I	Mathematical Foundations of Computer Science	At the end of this course, each student should be able to: CO1: To understand the basic notions of discrete and continuous probability. CO2: To understand the methods of statistical inference, and the role that sampling distributions play in those methods. CO3: To be able to perform correct and meaningful statistical analyses of simple to moderate complexity.
Professional Core - II	Advanced Data Structures	At the end of this course, each student should be able to: CO1: Understand the implementation of symbol table using hashing techniques.. CO2: Develop algorithms for text processing applications. CO3: Identify suitable data structures and develop algorithms for computational geometry problems.
Professional Elective - I	Information Security	At the end of this course, each student should be able to: CO1: Demonstrate the knowledge of cryptography, network security concepts and applications. CO2: Ability to apply security principles in system design. CO3: Ability to identify and investigate

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		vulnerabilities and security threats and mechanisms to counter them.
Professional Elective - I	Mobile Application Development	<p>At the end of this course, each student should be able to:</p> <p>CO1: Student understands the working of Android OS Practically.</p> <p>CO2: Student will be able to develop Android user interfaces</p> <p>CO3: Student will be able to develop, deploy and maintain the Android Applications.</p>
Professional Elective - I	Machine Learning	<p>At the end of this course, each student should be able to:</p> <p>CO1: Extract features that can be used for a particular machine learning approach in various IOT applications.</p> <p>CO2: To compare and contrast pros and cons of various machine learning techniques and to get an insight of when to apply a particular machine learning approach.</p> <p>CO3: To mathematically analyse various machine learning approaches and paradigms.</p>
Professional Elective - II	Network Security	<p>At the end of this course, each student should be able to:</p> <p>CO1: To understand basics of security and issues related to it.</p> <p>CO2: Understanding of biometric techniques available and how they are used in today's world.</p> <p>CO3: Security issues in web and how to tackle them.</p> <p>CO4: Learn mechanisms for transport and network security.</p>
Professional Elective - II	Cloud Computing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify security aspects of each cloud model</p> <p>CO2: Develop a risk-management strategy for moving to the Cloud</p> <p>CO3: Implement a public cloud instance using a public cloud service provider</p>

		CO4: Apply trust-based security model to different layer
Professional Elective - II	Data Mining	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to perform the preprocessing of data and apply mining techniques on it.</p> <p>CO2: Ability to identify the association rules, classification and clusters in large data sets.</p> <p>CO3: Ability to solve real world problems in business and scientific information using data mining</p> <p>CO4: Ability to classify web pages, extracting knowledge from the web</p>
Lab - I	Advanced Data Structures Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to select the data structures that efficiently model the information in a problem.</p> <p>CO2: Ability to assess efficiency trade-offs among different data structure implementations or combinations.</p> <p>CO3: Implement and know the application of algorithms for sorting and pattern matching.</p> <p>CO4: Design programs using a variety of data structures, including hash tables, binary and general tree structures, search trees, tries, heaps, graphs, and B-trees.</p>
Lab - II	Machine Learning Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand complexity of Machine Learning algorithms and their limitations;</p> <p>CO2: Understand modern notions in data analysis-oriented computing;</p> <p>CO3: Be capable of confidently applying common Machine Learning algorithms in practice and implementing their own;</p> <p>CO4: Be capable of performing experiments in Machine Learning using real-world data.</p>


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	Research Methodology & IPR	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand research problem formulation.</p> <p>CO2: Analyze research related information</p> <p>CO3: Follow research ethics</p> <p>CO4: Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity.</p> <p>CO5: Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasize the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular.</p> <p>CO6: 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.</p>
Audit - I	Audit Course - I	

M.Tech. I Year II Sem R19 Regulation Computer Science and Engineering

Course Code	Course Title / Name	Course Outcomes
Professional Core - III	Advanced Algorithms	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze the complexity/performance of different algorithms.</p> <p>CO2: Determine the appropriate data structure for solving a particular set of problems.</p> <p>CO3: Categorize the different problems in various classes according to their complexity.</p> <p>CO4: Students should have an insight of recent activities in the field of the advanced data structure.</p>


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Professional Core - IV	Advanced Computer Architecture	<p>At the end of this course, each student should be able to:</p> <p>CO1: Computational models and Computer Architectures.</p> <p>CO2: Concepts of parallel computer models.</p> <p>CO3: Scalable Architectures, Pipelining, Superscalar processors, multiprocessors</p>
Professional Elective - III	Web and Database Security	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the Web architecture and applications</p> <p>CO2: Understand client side and service side programming</p> <p>CO3: Understand how common mistakes can be bypassed and exploit the application</p> <p>CO4: Identify common application vulnerabilities</p>
Professional Elective - III	Internet of Things	<p>At the end of this course, each student should be able to:</p> <p>CO1: Interpret the impact and challenges posed by IoT networks leading to new architectural models.</p> <p>CO2: Compare and contrast the deployment of smart objects and the technologies to connect them to network.</p>
		<p>CO3: Appraise the role of IoT protocols for efficient network communication.</p> <p>CO4: Elaborate the need for Data Analytics and Security in IoT.</p> <p>CO5: Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.</p>
Professional Elective - III	Data Science	<p>At the end of this course, each student should be able to:</p> <p>CO1: Explain how data is collected, managed and stored for data science;</p> <p>CO2: Understand the key concepts in data science, including their real-world applications and the toolkit used by data scientists</p> <p>CO3: Implement data collection and management scripts using MongoDB</p>

Professional Elective - IV	Cyber Security	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.</p> <p>CO2: Design, develop, test and evaluate secure software.</p> <p>CO3: Develop policies and procedures to manage enterprise security risks.</p> <p>CO4: Evaluate and communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities and training.</p> <p>CO5: Interpret and forensically investigate security incidents.</p>
Professional Elective - IV	Advanced Computer Networks	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding of holistic approach to computer networking</p> <p>CO2: Ability to understand the computer networks and their application</p> <p>CO3: Ability to design simulation concepts related to packet forwarding in networks</p>
Professional Elective - IV	Big Data Analytics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Identify Big Data and its Business Implications.</p> <p>CO2: List the components of Hadoop and Hadoop Eco-System</p> <p>CO3: Access and Process Data on Distributed File System</p> <p>CO4: Manage Job Execution in Hadoop Environment</p> <p>CO5: Develop Big Data Solutions using Hadoop Eco System</p> <p>CO6: Analyze Infosphere Big Insights Big Data Recommendations.</p> <p>CO7: Apply Machine Learning Techniques using R.</p>



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Lab - III	Advanced Algorithms Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Design and analyze programming problem statements.</p> <p>CO2: Choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.</p> <p>CO3: Understand the necessary mathematical abstraction to solve problems.</p> <p>CO4: Come up with analysis of efficiency and proofs of correctness</p> <p>CO5: Comprehend and select algorithm design approaches in a problem specific manner.</p>
Lab - IV	Data Science Lab	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students will develop relevant programming abilities.</p> <p>CO2: Students will demonstrate proficiency with statistical analysis of data.</p> <p>CO3: Students will develop the ability to build and assess data-based models.</p> <p>CO4: Students will execute statistical analyses with professional statistical software.</p>
		<p>CO5: Students will demonstrate skill in data management.</p> <p>CO6: Students will apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively</p>
	Mini Project with Seminar	<p>At the end of this course, each student should be able to:</p> <p>CO1: Demonstrate a sound technical knowledge of their selected mini project topic.</p> <p>CO2: Undertake problem identification, formulation and solution.</p> <p>CO3: Design engineering solutions to complex problems utilising a systems approach.</p> <p>CO4: Communicate with engineers and the community at large.</p> <p>CO5: Demonstrate the knowledge, skills and attitudes of a professional engineer</p>

Audit - II	Audit Course - II	
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M.Tech. II Year III Sem R19 Regulation Computer Science and Engineering

Course Code	Course Title / Name	Course Outcomes
Professional Elective - V	Digital Forensics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand relevant legislation and codes of ethics.</p> <p>CO2: Computer forensics and digital detective and various processes, policies and procedures.</p> <p>CO3: E-discovery, guidelines and standards, E-evidence, tools and environment.</p> <p>CO4: Email and web forensics and network forensics.</p>
Professional Elective - V	High Performance Computing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding the concepts in grid computing</p> <p>CO2: Ability to set up cluster and run parallel applications</p> <p>CO3: Ability to understand the cluster projects and cluster OS</p> <p>CO4: Understanding the concepts of pervasive computing & quantum computing.</p>
Professional Elective - V	Deep Learning	<p>At the end of this course, each student should be able to:</p> <p>CO1: Ability to understand the concepts of Neural Networks</p> <p>CO2: Ability to select the Learning Networks in modeling real world systems</p> <p>CO3: Ability to use an efficient algorithm for Deep Models</p> <p>CO4: Ability to apply optimization strategies for large scale applications</p>
Open Elective	Open Elective	


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LIST OF AUDIT COURSE-I & II OFFERED FOR R19 M.TECH PROGRAMMES (CSE, EEE)

Course Code	Course Title / Name	Course Outcomes
Audit Course I & II	English for Research Paper Writing	At the end of this course, each student should be able to: CO1: Understand relevant legislation and codes of ethics. CO2: Computer forensics and digital detective and various processes, policies and procedures. CO3: E-discovery, guidelines and standards, E-evidence, tools and environment. CO4: Email and web forensics and network forensics.
Audit Course I & II	Disaster Management	At the end of this course, each student should be able to: CO1: Understanding the concepts in grid computing CO2: Ability to set up cluster and run parallel applications CO3: Ability to understand the cluster projects and cluster OS CO4: Understanding the concepts of pervasive computing & quantum computing.
Audit Course I & II	Sanskrit for Technical Knowledge	At the end of this course, each student should be able to: CO1: Understanding basic Sanskrit language CO2: Ancient Sanskrit literature about science & technology can be understood CO3: Being a logical language will help to develop logic in students
Audit Course I & II	Value Education	At the end of this course, each student should be able to: CO1: Knowledge of self-development CO2: Learn the importance of Human values CO3: Developing the overall personality
Audit Course I & II	Constitution of India	At the end of this course, each student should be able to: CO1: Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.

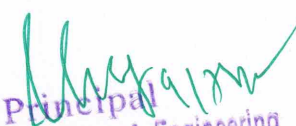

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		<p>CO2: Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.</p> <p>CO3: Discuss the circumstances surrounding the foundation of the Congress Socialist Party [CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.</p> <p>CO4: Discuss the passage of the Hindu Code Bill of 1956.</p>
Audit Course I & II	Pedagogy Studies	<p>At the end of this course, each student should be able to:</p> <p>CO1: What pedagogical practices are being used by teachers in formal and informal classrooms in developing countries?</p> <p>CO2: What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?</p> <p>CO3: How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?</p>
Audit Course I & II	Stress Management by yoga	<p>At the end of this course, each student should be able to:</p> <p>CO1: Develop healthy mind in a healthy body thus improving social health also</p> <p>CO2: Improve efficiency</p>
Audit Course I & II	Personality Development Through Life Enlightenment Skills	<p>At the end of this course, each student should be able to:</p> <p>CO1: Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life</p> <p>CO2: The person who has studied Geeta will lead the nation and mankind to peace and prosperity</p> <p>CO3: Study of Neetishatakam will help in developing versatile personality of students</p>

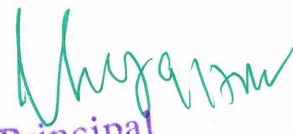

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LIST OF OPEN ELECTIVES OFFERED FOR R19 M.TECH PROGRAMMES (CSE,EEE)


Course Code	Course Title / Name	Course Outcomes
Open Elective	Numerical methods	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know the approximations in any calculations and solutions to equations</p> <p>CO2: Solve simultaneous equations using matrix methods</p> <p>CO3: Calculate differentiation and integration problems using numerical methods</p> <p>CO4: Solve ordinary and partial differential equations</p>
Open Elective	Construction Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Plan, coordinate and control of project from beginning to completion.</p> <p>CO2: Distinguish different types of contracts that can be used for a project</p> <p>CO3: Adopt the most effective method for meeting the requirement in order to produce a functionally and financially viable project.</p>
Open Elective	Finite Element Methods	<p>At the end of this course, each student should be able to:</p> <p>CO1: To understand the fundamental theory of the Finite Element Method</p> <p>CO2: To apply the Finite Element theory to solve soil behavior under external loads.</p>
Open Elective	Artificial Intelligence: Techniques	<p>At the end of this course, each student should be able to:</p> <p>CO1: Assess the applicability, strengths and weaknesses of problems and methods for particular engineering problem.</p> <p>CO2: Develop intelligent system for particular problem.</p> <p>CO3: Understand the concepts of Fuzzy logic, Applications in water resource engineering.</p>
Open Elective	Operation Research	<p>At the end of this course, each student should be able to:</p> <p>CO1: Apply the dynamic programming to solve</p>


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		<p>problems of discreet and continuous variables.</p> <p>CO2: Apply the concept of non-linear programming</p> <p>CO3: Carry out sensitivity analysis</p> <p>CO4: Model the real-world problem and simulate it.</p>
Open Elective	Industrial Safety	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know how to take safety measures in executing works</p> <p>CO2: Identify the need for maintenance (or) replacement of equipment</p> <p>CO3: Understand the need for periodic and preventive maintenance</p>
Open Elective	Environmental Legislation & Audit	<p>At the end of this course, each student should be able to:</p> <p>CO1: Interpret the Environment Protection (EP) Act 1986.</p> <p>CO2: Interpret the Water Act 1974 and Water Cess Act</p> <p>CO3: Interpret the Air Act 1981.</p> <p>CO4: Interpret the Hazardous waste Act 1989</p> <p>CO5: Analyze the 'Environmental Audit' done of an Industry and debate the method used to do so.</p> <p>CO6: Undertake Environmental Audit</p>
Open Elective	GIS & IoT For Planning & Policy Making for Smart Cities/Urban Areas	<p>At the end of this course, each student should be able to:</p> <p>CO1: The importance of National and International policies for smart cities</p> <p>CO2: Applications of with GIS for urban cities.</p> <p>CO3: Applications of IoT for smart cities</p> <p>CO3: The concepts of GIS and IoT at analytics level.</p> <p>CO4: Applications of IoT and GIS to reduce congestion and pollution in urban cities.</p>
Open Elective	Disaster Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding Disasters, man-made Hazards and Vulnerabilities.</p> <p>CO2: Understanding disaster management mechanism.</p> <p>CO3: Understanding capacity building concepts</p>


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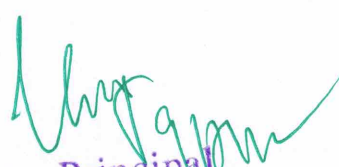
		and planning of disaster managements.
Open Elective	Disaster Analytics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the various disasters and their impact</p> <p>CO2: Understand the urban policies related to disaster</p> <p>CO3: Find methods to monitor disasters</p> <p>CO4: Understand ways to quantify and plan infrastructure</p> <p>CO5: Understand the concepts of Mapping and measuring disasters</p>
Open Elective	Principles of Automation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Explain various reasons for employing automation in a manufacturing environment and describe various applications.</p> <p>CO2: Describe the basic function of a sensor and an actuator in an automated system and give examples of both categories.</p> <p>CO3: Select an appropriate sensor and/or actuator for a given automated application.</p> <p>CO4: Describe the fundamentals of NC technology.</p> <p>CO5: Use a Programmable Logic Controller (PLC) and embedded microcontroller, to perform specified control functions.</p> <p>CO6: Describe the basic anatomy and attributes of an industrial robot.</p> <p>CO7: Identify and distinguish the different components and interfaces in a Flexible Manufacturing System.</p> <p>CO8: Troubleshoot a system and take appropriate action(s) to resolve the issue(s).</p> <p>CO9: Design an automated system to meet defined operational specifications.</p>
Open Elective	Artificial Neural Networks	<p>At the end of this course, each student should be able to:</p> <p>CO1: To understand artificial neural network models and their training algorithms</p>


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		<p>CO2: To understand the concept of fuzzy logic system components, fuzzification and defuzzification</p> <p>CO3: Applies the above concepts to real-world problems and applications.</p>
Open Elective	Fundamentals of Nano Technology	<p>At the end of this course, each student should be able to:</p> <p>CO1: To understand the evolution of Nano systems, and various fabrication techniques.</p> <p>CO2: Learn about nano materials and various nano measurements techniques.</p>
Open Elective	Concurrent Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the need of concurrent engineering and strategic approaches for product design.</p> <p>CO2: Apply concurrent design principles to product design.</p> <p>CO3: Design assembly workstation using concepts of simultaneous engineering.</p> <p>CO4: Design automated fabricated systems – Case studies.</p>
Open Elective	Mechanics of Composite Materials	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understanding of types, manufacturing processes, and applications of composite materials.</p> <p>CO2: Basic understanding of linear elasticity with emphasis on the difference between isotropic and anisotropic material behavior.</p> <p>CO3: Ability to analyze problems on macro and micro mechanical behavior of lamina</p> <p>CO4: Ability to analyze problems on macro mechanical behavior of laminate</p> <p>CO5: An ability to predict the loads and moments that cause an individual composite layer and a composite laminate to fail and to compute hygro thermal loads in composites.</p> <p>CO6: An ability to compute the properties of a composite laminate with any stacking</p>

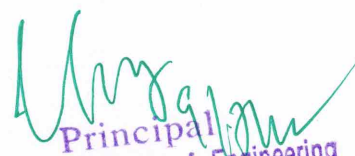

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		sequence.
Open Elective	Waste to Energy	<p>At the end of this course, each student should be able to:</p> <p>Understood and acquired fundamental knowledge on the science and engineering of energy technologies and systems. Acquired the expertise and skills required for energy auditing and management, economical calculation of energy cost, development, implementation, maintenance of energy systems. Become capable of analysis and design of energy conversion systems. Acquired skills in the scientific and technological communications and project preparation, planning and implementation of energy projects</p>
Open Elective	Concurrent Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the need of concurrent engineering and strategic approaches for product design.</p> <p>CO2: Apply concurrent design principles to product design.</p> <p>CO3: Design assembly workstation using concepts of simultaneous engineering.</p> <p>CO4: Design automated fabricated systems – Case studies.</p>
Open Elective	Principles of Automation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand characteristics, and working principle of different types of Power electronic devices and their applications.</p> <p>CO2: Analyse the various Triggering and Commutation methods of Thyristors.</p> <p>CO3: Describe the working of Choppers, Inverters and cycloconverter circuits and their applications.</p> <p>CO4: Select Thyristors circuits for various industrial / controlled applications.</p> <p>CO5: Understand basic concepts of PLC and develop application programs.</p> <p>CO6: Identify and interpret the functionality of DCS</p>


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		and various elements of SCADA.
Open Elective	Entrepreneurship	<p>At the end of this course, each student should be able to:</p> <p>CO1: To assess the commercial viability of a new technology-based idea. The candidate can use various methods and tools for this purpose.</p> <p>CO2: To transform research-based ideas into feasibility and business plans. The candidate can use (tacit and explicit) methods and tools for this purpose.</p> <p>CO3: To present new ideas to the market.</p> <p>CO4: To assess the need for innovation, initiate the process and run innovations in organizations.</p> <p>CO5: To seize opportunities, organize and finance viable initiatives through to fruition.</p>
Open Elective	Optimization Techniques & Applications	<p>At the end of this course, each student should be able to:</p> <p>CO1: Apply appropriate optimization techniques and solve optimization problem like single variable or multivariable</p> <p>CO2: Make sensitivity analysis to study effect of changes in parameters of LPP on the optimal solution without reworking.</p> <p>CO3: Simulate the system to estimate specified performance measures.</p> <p>CO4: Solve integer programming problem by either geometry cutting plane algorithm or branch and bound method.</p> <p>CO5: Apply chance constrained algorithm and solve stochastic linear programme.</p> <p>CO6: Formulate GP model and solve it.</p> <p>CO7: Solve given optimization problem by genetic algorithm or simulated annealing or PSO.</p>
Open Elective	Advanced Finite Element and Boundary Element Methods	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand the background of mathematical equations used for development of modeling software modules to develop the various structural related applications</p>

		<p>CO2: Identify mathematical model for solution of common engineering problems.</p> <p>CO3: Solve structural, thermal, fluid flow problems.</p> <p>CO4: Use professional-level finite element software to solve engineering problems in Solid mechanics, fluid mechanics and heat transfer.</p>
Open Elective	Fundamentals of Production Engineering	<p>At the end of this course, each student should be able to:</p> <p>CO1: Acquire fundamental knowledge and understanding of Production and Industrial Engineering.</p> <p>CO2: Acquire abilities and capabilities in the areas of advanced manufacturing methods, quality assurance and shop floor management.</p> <p>CO3: Formulate relevant research problems; conduct experimental and/or analytical work and analyzing results using modern mathematical and scientific methods.</p> <p>CO4: Review and document the knowledge developed by scholarly predecessors and critically assess the relevant technological issues.</p> <p>CO5: Design and validate technological solutions to defined problems and write clearly and effectively for the practical utilization of their work.</p>
Open Elective	Testing & Evaluation	<p>At the end of this course, each student should be able to:</p> <p>CO1: Explain central concepts and issues in language testing, such as basic types of language tests (and their specific features).</p> <p>CO2: Explain central concepts and issues in evaluation of language proficiency.</p> <p>CO3: Understand the key principles of test construction and validation, and apply them in the development of a specific language test.</p> <p>CO4: Administer a language test and analyse its results.</p> <p>CO5: Appraise validity and reliability aspects of</p>


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		language testing.
Open Elective	Basics of Refrigeration Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Illustrate the basic concepts of refrigeration system.</p> <p>CO2: Analyze the vapour compression cycle and interpret the usage of refrigerants.</p> <p>CO3: Explain the components of vapour absorption system.</p> <p>CO4: Demonstrate the use of refrigerants.</p> <p>CO5: Discuss the theory Ozone depletion potential and global warming potential.</p>
Open Elective	Introduction to Thermal Storage Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: To be able to state the types-energy storage devices – comparison of energy storage technologies.</p> <p>CO2: To be able to identify and describe Basic concepts and modeling of heat storage units – modeling of simple water and rock bed storage system.</p> <p>CO3: To be able to explain at a level understandable by a non-technical person how various Parallel flow and counter flow regenerators.</p> <p>CO4: To be able to calculate Modeling of phase change problems.</p> <p>CO5: To be able to explain greenhouse heating – power plant applications – drying and heating for process industries.</p>
Open Elective	Cogeneration & Waste Heat Recovery Systems	<p>At the end of this course, each student should be able to:</p> <p>CO1: Analyze the basic energy generation cycles</p> <p>CO2: Do the economic analysis of waste heat recovery systems</p>
Open Elective	Business Analytics	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students will demonstrate knowledge of data analytics.</p> <p>CO2: Students will demonstrate the ability of think critically in making decisions based on data</p>

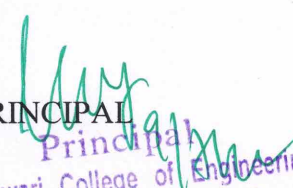


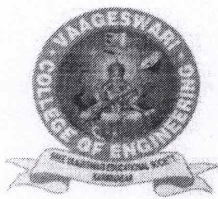
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		<p>and deep analytics.</p> <p>CO3: Students will demonstrate the ability to use technical skills in predicative and prescriptive modeling to support business decision-making.</p> <p>CO4: Students will demonstrate the ability to translate data into clear, actionable insights.</p>
Open Elective	Industrial Safety	<p>At the end of this course, each student should be able to:</p> <p>CO1: Know how to take safety measures in executing works</p> <p>CO2: Identify the need for maintenance (or) replacement of equipment</p> <p>CO3: Understand the need for periodic and preventive maintenance</p>
Open Elective	Operations Research	<p>At the end of this course, each student should be able to:</p> <p>CO1: Students should be able to apply the dynamic programming to solve problems of discrete and continuous variables.</p> <p>CO2: Students should be able to apply the concept of non-linear programming</p> <p>CO3: Students should be able to carry out sensitivity analysis</p> <p>CO4: Student should be able to model the real-world problem and simulate it.</p>
Open Elective	Cost Management of Engineering Projects	<p>At the end of this course, each student should be able to:</p> <p>CO1: Understand project characteristics and various stages of a project.</p> <p>CO2: Understand the conceptual clarity about project organization and feasibility analyses –Market, Technical, Financial and Economic.</p> <p>CO3: Analyze the learning and understand techniques for Project planning, scheduling and Execution Control.</p> <p>CO4: Apply the risk management plan and analyse the role of stakeholders.</p> <p>CO5: Understand the contract management, Project</p>

		<p>Procurement, Service level Agreements and productivity.</p> <p>CO6: Understand the How Subcontract Administration and Control are practiced in the Industry.</p>
Open Elective	Composite Materials	<p>At the end of this course, each student should be able to:</p> <p>CO1: Explain the mechanical behavior of layered composites compared to isotropic materials.</p> <p>CO2: Apply constitutive equations of composite materials and understand mechanical behavior at micro and macro levels.</p> <p>CO3: Determine stresses and strains relation in composites materials.</p>
Open Elective	Energy from Waste	<p>At the end of this course, each student should be able to:</p> <p>CO1: Apply the knowledge about the operations of Waste to Energy Plants.</p> <p>CO2: Analyse the various aspects of Waste to Energy Management Systems.</p> <p>CO3: Carry out Techno-economic feasibility for Waste to Energy Plants.</p> <p>CO4: Apply the knowledge in planning and operations of Waste to Energy plants.</p>


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VAAGESWARI COLLEGE OF ENGINEERING

Beside LMD Police Station, Ramakrishna Colony,
KARIMNAGAR, Telangana state – 505 527
Affiliated to Jawaharlal Nehru Technological University Hyderabad,
Approved by AICTE New Delhi

MASTER OF BUSINESS ADMINISTRATION

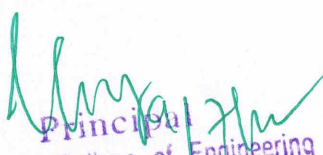
COURSE OUTCOMES (COs)

Master of Business Administration I Year I Sem R19 Regulation

Course Code	Course Title / Name	Course Outcomes
19MBA01	Management and Organizational Behaviour	At the end of this course, each student should be able to: CO1: Evolution of Management and contribution of Management thinkers CO2: The relevance of environmental scanning, planning and to take decisions, CO3: Organizing and controlling CO4: Individual and group behaviour CO5: Leadership and Motivation.
19MBA02	Business Economics	At the end of this course, each student should be able to: CO1: Economic Principles in Business CO2: Forecast Demand and Supply CO3: Production and Cost Estimates CO4: Market Structure and Pricing Practices
19MBA03	Financial Accounting & Analysis	At the end of this course, each student should be able to: CO1: Principles of Accounting, Accounting Process CO2: Inventory Valuation CO3: Preparation, Analysis and Interpretation of Financial Statements.
19MBA04	Research Methodology and Statistical Analysis	At the end of this course, each student should be able to: CO1: Conceptual overview of Research CO2: To apply, analyze various simple & advanced statistical tools


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		CO3: To apply the principles of research methodology for various projects.
19MBA05	Legal and Business Environment	At the end of this course, each student should be able to: CO1: Business Laws related to incorporating a company CO2: Law of contract and Negotiable Instruments CO3: Regulatory framework in India.
Open Elective-I 19MBA06	Business Ethics and Corporate Governance	At the end of this course, each student should be able to: CO1: Need for Business Ethics and Corporate Governance in India CO2: Codes and Committees in Corporate Governance CO3: Role of Board in Corporate Governance CO4: Stakeholder perspective of Corporate Governance
Open Elective-I 19MBA06	Project Management	At the end of this course, each student should be able to: CO1: Importance of Project Management CO1: Project Planning, Execution and implementation CO1: Significance of teams in projects CO1: Project evaluation techniques.
Open Elective-I 19MBA06	Technology Management	At the end of this course, each student should be able to: CO1: Importance of Technological Innovation CO2: Importance of Research and development in technology management CO3: Forecasting of Technology
Open Elective-I 19MBA06	Cross Cultural Management	At the end of this course, each student should be able to: CO1: Importance of culture CO2: Values CO3: Culture and styles of Management CO4: Communication in different cultures CO5: Cross cultural team management.
19MBA07	Business Communication Lab.	At the end of this course, each student should be able to:


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		CO1: The importance of Communication in Business CO2: To develop writing skills and presentation CO3: Writing business proposals and letters CO4: Application of business communication in the self-development process.
19MBA08	Statistical Data Analysis Lab	At the end of this course, each student should be able to: CO1: Analyse and apply the statistical tools for decision making CO2: Hypotheses Testing CO3: Discussion of Results for better decision making.

Master Of Business Administration I Year II Sem R19 Regulation

Course Code	Course Title / Name	Course Outcomes
19MBA09	Human Resource Management	At the end of this course, each student should be able to: CO1: HR concepts CO2: Process of recruitment and selection, CO3: Learning and development CO4: Performance Management and Compensation CO5: Employee retention strategies CO6: Employee welfare and grievances.
19MBA10	Marketing Management	At the end of this course, each student should be able to: CO1: Concepts of marketing management CO2: To analyze markets and design customer driven strategies CO3: To communicate the decisions towards business development with superior customer value.
19MBA11	Financial Management	At the end of this course, each student should be able to: CO1: Goals of financial function CO2: Investment criteria and decision process CO3: Capital structure and Dividend Decisions CO4: Asset Liability management


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19MBA12	Quantitative Analysis for Business Decisions	<p>At the end of this course, each student should be able to:</p> <p>CO1: The course covers origin and application of OR.</p> <p>CO2: Linear Programming Method,</p> <p>CO3: Decision Theory and queuing theory. These concepts help the student in taking decisions for business.</p>
19MBA13	Entrepreneurship	<p>At the end of this course, each student should be able to:</p> <p>CO1: Mindset of the entrepreneurs,</p> <p>CO2: Identify ventures for launching,</p> <p>CO3: Develop an idea on the legal framework and</p> <p>CO4: Strategic perspectives in entrepreneurship.</p>
19MBA13	Logistics & Supply Chain Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Growing importance of Logistics and Supply Chain Management</p> <p>CO2: LSCM Costs and Performance</p> <p>CO3: Benchmarking in SCM</p> <p>CO4: Sourcing and transportation</p> <p>CO5: Global aspects in SCM</p>
Open Elective-II 19MBA15	Total Quality Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Importance of Quality</p> <p>CO2: Principles and Practices of TQM</p> <p>CO3: Tools and techniques in Quality management.</p>
Open Elective-II 19MBA15	Marketing Research	<p>At the end of this course, each student should be able to:</p> <p>CO1: Importance of Marketing Research</p> <p>CO2: Research design</p> <p>CO3: Scaling and sampling methodology</p> <p>CO4: Data presentation</p>
Open Elective-II 19MBA15	International Business	<p>At the end of this course, each student should be able to:</p> <p>CO1: Importance of International Business</p> <p>CO2: International Trade theories</p> <p>CO3: International Economic environment</p> <p>CO4: Strategic and operational issues of IB</p>


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Open Elective-II 19MBA15	Rural Marketing	At the end of this course, each student should be able to: CO1: Rural Marketing opportunities CO2: Rural Economy and Environment CO3: Social and cultural aspects in rural India CO4: Innovations in rural marketing.
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Master of Business Administration II Year I & II Sem R19 Regulation

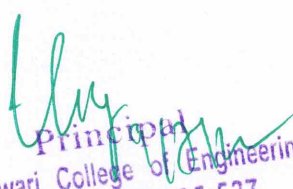
Course Code	Course Title / Name	Course Outcomes
	Summer Internship	At the end of this course, each student should be able to: CO1: Management functions and Organizational structure CO2: Organizational dynamics in terms of organizational behaviour, culture, climate CO3: Functional domain knowledge CO4: Processes and systems CO5: External and Internal environment impact on the organization.
19MBA16	Production And Operations Management	At the end of this course, each student should be able to: CO1: Concepts of Operations management, CO2: Product & process design, analysis, CO3: Plant location and layout, CO4: Scheduling and Material Management.
19MBA17	Management Information System	At the end of this course, each student should be able to: CO1: Concepts & applications of Management Information Systems CO2: Information Systems Planning & Implementations CO3: Cyber crime and information security.
19MBA18	Data Analytics	At the end of this course, each student should be able to: CO1: Importance of Analytics CO2: Understanding the analytical tools CO3: Application of Analytical tools to solve business problems.


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19MBA23	Strategic Management	At the end of this course, each student should be able to: CO1: Strategic management concepts CO2: Tools and Techniques for Strategic analysis CO3: Strategies for competing in globalised markets CO4: Strategy Evaluation and Control.
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MBA List Of Elective Subjects (Marketing, Finance, Human Resources, Entrepreneurship)

Course Code	Course Title / Name	Course Outcomes
19MBA19M1	Digital Marketing	At the end of this course, each student should be able to: CO1: The applications of digital marketing in the globalized market CO2: Channels of Digital Marketing CO3: Digital marketing plan CO4: Search engine marketing CO5: Online Advertising
19MBA20M2	Advertising and Sales Management	At the end of this course, each student should be able to: Student will be able to understand the importance of Sales Management, Sales Planning and Budgeting and need for distribution channels and managing them.
19MBA21M3	Consumer Behaviour	At the end of this course, each student should be able to: CO1: Understand consumer behaviour CO2: Environmental influences on consumer behaviour, CO3: Perception and attitude of consumers, CO4: Consumer decision making CO5: Marketing ethics towards consumers.
19MBA24M4	Customer Relationship Management	At the end of this course, each student should be able to: CO1: Need of CRM CO2: Building customer relations CO3: CRM process CO4: CRM structures CO5: Planning and Implementation of CRM.

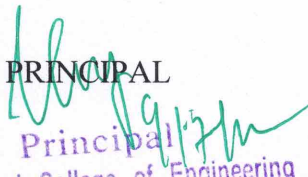

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19MBA25M5	International Marketing	<p>At the end of this course, each student should be able to:</p> <p>CO1: The Global Marketing Management, CO2: Environment of global markets, CO3: Assessing Global Market Opportunities, CO4: Developing and Implementing Global Marketing Strategies.</p>
19MBA26M6	Services Marketing	<p>At the end of this course, each student should be able to:</p> <p>CO1: Marketing Management of companies offering Services CO2: Characteristics of services, CO3: To understand consumer behaviour in services, CO4: Align service design and standards, CO5: Delivering service, managing services promises.</p>
19MBA19F1	Security Analysis and Portfolio Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: Indian Investment Environment CO2: Portfolio Analysis CO3: Bond valuation and management CO4: Equity valuation of Cash market and derivatives CO5: Performance evaluation of Portfolios.</p>
19MBA20F2	Financial Institutions, Markets & Services	<p>At the end of this course, each student should be able to:</p> <p>CO1: Introduction to Indian Financial system CO2: Banking and Non-Banking Institutions CO3: Financial and Securities markets CO4: Fund and Fee based services.</p>
19MBA21F3	Strategic Management Accounting	<p>At the end of this course, each student should be able to:</p> <p>CO1: Fundamentals of Management accounting and Cost accounting CO2: Cost analysis CO3: Marginal costing CO4: Budget and Budgetary controls.</p>
19MBA24F4	International Financial Management	<p>At the end of this course, each student should be able to:</p> <p>CO1: International Financial Management CO2: Balance of Payments CO3: Foreign Exchange Markets CO4: Asset and liability Management.</p>

19MBA25F5	Strategic Investment and Financing Decisions	At the end of this course, each student should be able to: CO1: Investment Decisions in Risk and uncertainty CO2: Strategic investment decisions CO3: Investment Appraisal Techniques CO4: Financing Decisions
19MBA26F6	Risk Management and Financial Derivatives	At the end of this course, each student should be able to: CO1: Concepts of Risk Management CO2: Risk Management Measurement CO3: Risk Management using Forward and Futures CO4: Risk Management using Options and Swaps.
19MBA19H1	Performance Management Systems	At the end of this course, each student should be able to: CO1: Significance of Performance Management CO2: Communication of Performance Management CO3: Performance Management and Development of Employees CO4: Reward System, CO5: Other performance related concepts.
19MBA20H2	Learning and Development	At the end of this course, each student should be able to: CO1: The importance of Learning performance CO2: Training and Development CO3: Training Need Analysis CO4: Training Methods
19MBA21H3	Management of Industrial Relations	At the end of this course, each student should be able to: CO1: Importance of Industrial Relations CO2: Collective Bargaining Mechanism CO3: Parties and role in Industrial Relations CO4: Labour Legislation aspects.
19MBA24H4	International Human Resource Management	At the end of this course, each student should be able to: CO1: Cultural aspects of IHRM CO2: Role of IHRM in Successful MNC CO3: Global human Resource Planning CO4: Training and development of Global employees CO5: Performance Management of Global employees.

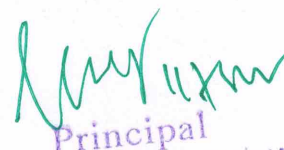
19MBA25H5	Leadership and Change Management	At the end of this course, each student should be able to: CO1: Leadership, Role and function of a Leader
		CO2: Leadership theories and styles CO3: Organizational change concepts CO4: Perspectives of change CO5: Strategies for Managing change
19MBA26H6	Talent and Knowledge Management	At the end of this course, each student should be able to: CO1: Talent Management Process CO2: Succession and career planning approaches CO3: Knowledge management aspects CO4: Knowledge management assessment and solutions
19MBA19E1	Startup Management	At the end of this course, each student should be able to: CO1: Startup opportunities CO2: Legal and other requirements for new ventures CO3: Financial Issues of startups CO4: Sustainability and growth of startups CO5: Exit strategies
19MBA20E2	MSME Management	At the end of this course, each student should be able to: CO1: Issues and Challenges in MSMEs CO2: Setting up of MSMEs CO3: Management of MSMEs CO4: Institution and Government support.
19MBA21E3	Family Business Management	At the end of this course, each student should be able to: CO1: Perspectives in Family Business CO1: Ownership Challenge and Family Governance CO1: Successor Development strategies CO1: Strategic Planning and Transgenerational Entrepreneurship CO1: New Leaders of the Evolution and Change.
19MBA24E4	Entrepreneurial Finance	At the end of this course, each student should be able to: CO1: Financing through venture life cycle CO1: Organizing and operating the enterprise CO1: Financial Planning of an enterprise CO1: Valuation of an enterprise

		CO1: Financing for growing enterprises.
19MBA25E5	Entrepreneurial Marketing	At the end of this course, each student should be able to: CO1: Marketing mix of an enterprise CO1: Growth and marketing strategies CO1: Market Development strategies CO1: Contemporary issues in Entrepreneurial marketing.
19MBA26E6	Creativity Innovation and Entrepreneurship	At the end of this course, each student should be able to: CO1: Basics of Creativity CO1: Creative Problemsolving CO1: Creative Intelligence CO1: Perspectives of Innovation

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DEPARTMENT OF MASTER OF COMPUTER APPLICATION

Course Name: C201(MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE)	
On completion of the course,Students will be able to :	
C201.1	Ability to understand and construct precise mathematical proofs
C201.2	Ability to use logic and set theory to formulate precise statements
C201.3	Ability to analyze and solve counting problems on finite and discrete structures.
C201.4	Ability to describe and manipulate sequences
C201.5	Ability to apply graph theory in solving computing problems.
Course Name: C202(C AND DATA STRUCTURES)	
On completion of the course,Students will be able to :	
C202.1	Ability to develop C programs for computing and real-life applications using basic elements like control statements, arrays, functions, pointers and strings; and data structures like stacks,queues and linked lists.
C202.2	Ability to implement searching and sorting algorithms
Course Name: C203 (PYTHON PROGRAMMING)	
On completion of the course,Students will be able to :	
C203.1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions
C203.2	Demonstrate proficiency in handling Strings and File Systems..
C203.3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
C203.4	Interpret the concepts of Object-Oriented Programming as used in Python
C203.5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.
Course Name: C204(OPERATING SYSTEMS)	
On completion of the course,Students will be able to :	
C204.1	Control access to a computer and the files that may be shared.
C204.2	Demonstrate the knowledge of the components of computer and their respective roles in computing.
C204.3	Recognize and resolve user problems with standard operating environments.
C204.4	Gain practical knowledge of how programming languages, operating systems, and architectures interact and how to use each effectively.
Course Name: C205(ACCOUNTING AND FINANCIAL MANAGEMENT)	
On completion of the course,Students will be able to :	
C205.1	Able to prepare balance sheets of budget
C205.2	Get the skill to manage finances of a firm/company



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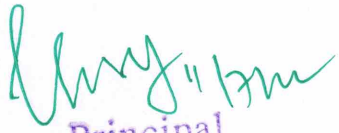
Course Name: C206(DATA STRUCTURES THROUGH C LAB)	
On completion of the course,Students will be able to :	
C206.1	Develop C programs for computing and real life applications using basic elements like control statements, arrays, functions, pointers and strings, and data structures like stacks, queues and linked lists
C206.2	Implement searching and sorting algorithms
Course Name: C207(PYTHON PROGRAMMING LAB)	
On completion of the course,Students will be able to :	
C207.1	Student should be able to understand the basic concepts scripting and the contributions of scripting language
C207.2	Ability to explore python especially the object-oriented concepts, and the built-in objects of Python.
C207.3	Ability to create practical and contemporary applications such as TCP/IP network programming, Web applications, discrete event simulations
Course Name: C209(OPERATING SYSTEMS LAB)	
On completion of the course,Students will be able to :	
C209.1	Simulate and implement operating system concepts such as scheduling, deadlock management, file management and memory management..
C209.2	Able to implement C programs using Unix system calls.
Course Name: C210(JAVA PROGRAMMING II)	
On completion of the course,Students will be able to :	
C210.1	Develop applications for a range of problems using object-oriented programming techniques
C210.2	Design simple Graphical User Interface applications
Course Name: C211(DATABASE MANAGEMENT SYSTEMS)	
On completion of the course,Students will be able to :	
C211.1	Gain knowledge of fundamentals of DBMS, database design and normal forms
C211.2	Master the basics of SQL for retrieval and management of data.
C211.3	Be acquainted with the basics of transaction processing and concurrency control.
C211.4	Familiarity with database storage structures and access techniques
Course Name: C212(COMPUTER NETWORKS)	
On completion of the course,Students will be able to :	
C212.1	Gain the knowledge of the basic computer network technology
C212.2	Gain the knowledge of the functions of each layer in the OSI and TCP/IP reference model.
C212.3	Obtain the skills of subnetting and routing mechanisms.
C212.4	Familiarity with the essential protocols of computer networks, and how they can be applied in network design and implementation.
Course Name: C213(DATA MINING)	
On completion of the course,Students will be able to :	

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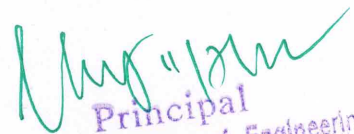
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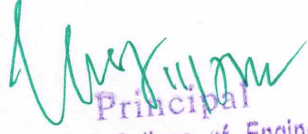
C213.1	Ability to perform the preprocessing of data and apply mining techniques on it.
C213.2	Ability to identify the association rules, classification and clusters in large data sets.
C213.3	Ability to solve real world problems in business and scientific information using data mining.
C213.4	Ability to classify web pages, extracting knowledge from the web..
Course Name: C214(SOFTWARE ENGINEERING)	
On completion of the course,Students will be able to :	
C214.1	Ability to translate end-user requirements into system and software requirements, using e.g.UML, and structure the requirements in a Software Requirements Document (SRD).
C214.2	Identify and apply appropriate software architectures and patterns to carry out high level design of a system and be able to critically compare alternative choices.
C214.3	Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.
Course Name: C216(DATABASE MANAGEMENT SYSTEMS & DATA MINING LAB)	
On completion of the course,Students will be able to :	
C216.1	Design database schema for a given application and apply normalization.
C216.2	Acquire skills in using SQL commands for data definition and data manipulation.
C216.3	Develop solutions for database applications using procedures, cursors and triggers
Course Name: C217(SOFTWARE ENGINEERING LAB)	
On completion of the course,Students will be able to :	
C217.1	Ability to translate end-user requirements into system and software requirements.
C217.2	Ability to generate a high-level design of the system from the software requirements.
C217.3	Will have experience and/or awareness of testing problems and will be able to develop a simple testing report.
Course Name: C218(JAVA PROGRAMMING LAB)	
On completion of the course,Students will be able to:	
C218.1	Develop applications for a range of problems using object-oriented programming techniques.
C218.2	Design simple Graphical User Interface applications.
Course Name: C301(CLOUD APPLICATIONS)	
On completion of the course,Students will be able to :	
C301.1	Develop cloud-based applications.
C301.2	Deploy the application on real cloud.
C301.3	To analyze and trouble shoot the problems while deploying application on cloud.
C301.4	Use application-based technologies for developing application using cloud.


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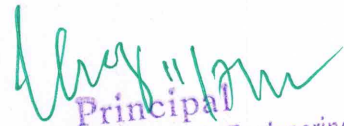
C301.5	Use public cloud like IBM Bluemix, Amazon AWS, Google cloud platform or Microsoft Azure for developing an application.
Course Name: C302(WEB TECHNOLOGIES)	
On completion of the course,Students will be able to :	
C302.1	Understand server-side scripting with PHP language.
C302.2	Understand what is XML and how to parse and use XML Data with Java.
C302.3	To introduce Server-side programming with Java Servlets and JSP.
Course Name: C303(INTERNET OF THINGS)	
On completion of the course,Students will be able to :	
C303.1	Interpret the impact and challenges posed by IoT networks leading to new architectural models.
C303.2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.
C303.3	Appraise the role of IoT protocols for efficient network communication.
C303.4	Elaborate the need for Data Analytics and Security in IoT.
C303.5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry.
Course Name: C304(ARTIFICIAL INTELLIGENCE)	
On completion of the course,Students will be able to :	
C304.1	To learn the distinction between optimal reasoning Vs. human like reasoning.
C304.2	To understand the concepts of state space representation, exhaustive search, heuristic search together with the time and space complexities.
C304.3	To learn different knowledge representation techniques.
C304.4	To understand the applications of AI, namely game playing, theorem proving, and machine learning.
Course Name: C305(INFORMATION RETRIEVAL SYSTEMS)	
On completion of the course,Students will be able to :	
C305.1	Ability to formulate an efficient problem space for a problem expressed in natural language
C305.2	Select a search algorithm for a problem and estimate its time and space complexities.
C305.3	Possess the skill for representing knowledge using the appropriate technique for a given problem.
C305.4	Possess the ability to apply AI techniques to solve problems of game playing, and machine learning.
Course Name: C306(AD-HOC AND SENSOR NETWORKS)	
On completion of the course,Students will be able to :	
C306.1	Ability to understand the state-of-the-art research in the emerging subject of Ad Hoc and Wireless Sensor Networks.
C306.2	Ability to solve the issues in real-time application development based on ASN.
C306.3	Ability to conduct further research in the domain of ASN
Course Name: C307(CYBER SECURITY)	


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On completion of the course,Students will be able to :	
C307.1	The students will be able to understand cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.
C307.2	To study the defensive techniques against these attacks.
Course Name: C308(MOBILE COMPUTING)	
On completion of the course,Students will be able to :	
C308.1	Able to think and develop new mobile application.
C308.2	Able to take any new technical issue related to this new paradigm and come up with a solution(s).
C308.3	Able to develop new ad hoc network applications and/or algorithms/protocols.
C308.4	Able to understand & develop any existing or new protocol related to the mobile environment.
Course Name: C309(SOFTWARE TESTING METHODOLOGIES)	
On completion of the course,Students will be able to :	
C309.1	Design and develop the best test strategies in accordance to the development model
C309.2	To provide knowledge of the concepts in software testing such as testing process, criteria, strategies, and methodologies.
Course Name: C310(INTERNET OF THINGS LAB)	
On completion of the course,Students will be able to :	
C310.1	a student should be able to write and test on an Raspberry Pi, but not limited to this only.
Course Name: C311(CLOUD APPLICATIONS LAB)	
On completion of the course,Students will be able to :	
C311.1	Configure various virtualization tools such as Virtual Box, VMware workstation.
C311.2	Design and deploy a web application in a PaaS environment.
C311.3	Learn how to simulate a cloud environment to implement new schedulers
C311.4	Install and use a generic cloud environment that can be used as a private cloud.
C311.5	Manipulate large data sets in a parallel environment
Course Name: C312 (WEB TECHNOLOGIES LAB)	
On completion of the course,Students will be able to :	
C312.1	Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML.
Course Name: C313(MACHINE LEARNING)	
On completion of the course,Students will be able to :	
C313.1	Understand the concepts of computational intelligence like machine learning.
C313.2	Ability to get the skill to apply machine learning techniques to address the real time problems in different areas.
C313.3	Understand the Neural Networks and its usage in machine learning application
Course Name: C314(MOBILE APPLICATION DEVELOPMENT)	
On completion of the course,Students will be able to :	
C314.1	Student understands the working of Android OS Practically.


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C314.2	Student will be able to develop Android user interfaces
C314.3	Student will be able to develop, deploy and maintain the Android Applications.
Course Name: C315(BIG DATA ANALYTICS)	
On completion of the course,Students will be able to :	
C315.1	Student understands the working of Android OS Practically
C315.2	Student will be able to develop Android user interfaces
C315.3	Student will be able to develop, deploy and maintain the Android Applications
Course Name: C316(E-COMMERCE)	
On completion of the course,Students will be able to :	
C316.1	Ability to identify the business relationships between the organizations and their customers
C316.2	Ability to perform various transactions like payment, data transfer and etc.
Course Name: C 401(CYBER LAWS AND PRIVACY)	
On completion of the course,Students will be able to :	
C401.1	International best practices and the various legal mechanisms to control the various offences in the cyberspace
C401.2	The various remedies available under the Information Technology Act for the breach and commission of offence in cyber space.
Course Name: C402 (MANAGEMENT INFORMATION SYSTEM)	
On completion of the course,Students will be able to :	
C402.1	Understand the usage of MIS in organizations and the constituents of the MIS.
C402.2	Understand the classifications of MIS, understanding of functional MIS and the different functionalities of these MIS. This would be followed by case study on Knowledge management.
C402.3	Assess the requirement and stage in which the organization is placed. Nolan model is expected to aid such decisions.
Course Name: C403(ENTREPRENEURSHIP)	
On completion of the course,Students will be able to :	
C403.1	It enables students to learn the basics of Entrepreneurship and entrepreneurial development which will help them to provide vision for their own Start-up.
C403.2	The aim of this course is to have a comprehensive perspective of inclusive learning, ability to Learn and implement the Fundamentals of Entrepreneurship.
Course Name: C404(COMPUTER ORGANIZATION & ARCHITECTURE)	
On completion of the course,Students will be able to :	
C404.1	Understand the basics of instructions sets and their impact on processor design.
C404.2	Demonstrate an understanding of the design of the functional units of a digital computer system.
C404.3	Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory
C404.4	Design a pipeline for consistent execution of instructions with minimum hazards
C404.5	Recognize and manipulate representations of numbers stored in digital computers

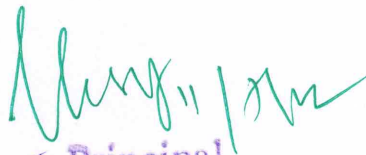

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Course Name: C405(COMPUTER PROGRAMMING & DATA STRUCTURES)	
On completion of the course,Students will be able to :	
C405.1	Ability to develop C programs for computing and real life applications using basic elements like control statements, arrays, functions, pointers and strings; and data structures like stacks,queues and linked lists
C405.2	Ability to implement searching and sorting algorithms
Course Name: C406(COMPUTER ORIENTED STATISTICAL METHODS)	
On completion of the course,Students will be able to :	
C406.1	Apply the concepts of probability and distributions to some case studies.
C406.2	Correlate the material of one unit to the material in other units
C406.3	Resolve the potential misconceptions and hazards in each topic of study.
Course Name: C407(PROFESSIONAL COMMUNICATION SKILLS)	
On completion of the course,Students will be able to :	
C407.1	Ability to convert the conceptual understanding of communication into every day practice.
C407.2	Ability to communicate their ideas relevantly and coherently in professional writing.
Course Name: C408(PROFESSIONAL COMMUNICATION SKILLS LAB)	
On completion of the course,Students will be able to :	
C408.1	Better Understanding of nuances of language through audio- visual experience and group activities
C408.2	Neutralization of accent for intelligibility
C408.3	Speaking with clarity and confidence thereby enhancing employability skills of the students
Course Name: 409(IT WORKSHOP LAB)	
On completion of the course,Students will be able to :	
C409.1	Apply knowledge for computer assembling and software installation..
C409.2	Ability how to solve the trouble shooting problems.
C409.3	Apply the tools for preparation of PPT, Documentation and budget sheet etc
Course Name: 410(OBJECT ORIENTED PROGRAMMING)	
On completion of the course,Students will be able to :	
410.1	Develop applications for a range of problems using object-oriented programming techniques
410.2	Design simple Graphical User Interface applications
Course Name: 411(OPERATIONS RESEARCH)	
On completion of the course,Students will be able to :	
411.1	Gain the knowledge of optimization techniques
411.2	Get the skill to apply Optimization techniques to address the real time problems
Course Name: 412(ADVANCED DATA STRUCTURES & ALGORITHMS)	

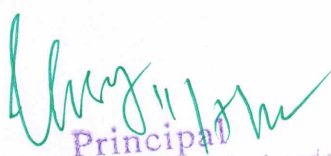

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On completion of the course,Students will be able to :	
412.1	Ability to analyze the performance of algorithms
412.2	Ability to select the data structures that efficiently model the information in a problem
412.3	Ability to choose appropriate data structures and algorithm design methods for a specified application
412.4	Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs
412.5	Design programs using a variety of data structures, including hash tables, disjoint sets, trees and graphs
Course Name: 413(INFORMATION SECURITY)	
On completion of the course,Students will be able to :	
C413.1	Demonstrate the knowledge of cryptography, network security concepts and applications
C413.2	Ability to apply security principles in system design.
C413.3	Ability to identify and investigate vulnerabilities and security threats and mechanisms to counter them.

Course Name: 414(NETWORK ADMINISTRATION LAB)	
On completion of the course,Students will be able to :	
C414.1	Student understands Linux commands for configuring system
C414.2	Student acquires requisite skills in network installation, administration maintenance

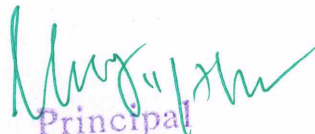

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Course Name: C415(ADVANCED DATA STRUCTURES & ALGORITHMS LAB)	
On completion of the course,Students will be able to :	
C415.1	Ability to select the data structures that efficiently model the information in a problem.
C415.2	Ability to assess efficiency trade-offs among different data structure implementations or combinations.
C415.3	Implement and know the application of algorithms for sorting and pattern matching.
C415.4	Design programs using tree structures, including Optimal binary search tree, All pairs shortest path problem, AVL tree, Red-Black trees.
Course Name: C416(CLOUD COMPUTING)	
On completion of the course,Students will be able to :	
C416.1	Ability to understand various service delivery models of a cloud computing architecture.
C416.2	Ability to understand the ways in which the cloud can be programmed and deployed.
C416.3	Understanding cloud service providers.
Course Name: C417(AUTOMATA & COMPILER DESIGN)	
On completion of the course,Students will be able to :	
C417.1	Able to understand the concept of abstract machines and their power to recognize the languages.
C417.2	Able to employ finite state machines for modeling and solving computing problems.
C417.3	Able to design context free grammars for formal languages.
Course Name: C418(COMPUTER GRAPHICS)	
On completion of the course,Students will be able to :	
C418.1	Acquire familiarity with the relevant mathematics of computer graphics.
C418.2	Acquire familiarity with the relevant mathematics of computer graphics
C418.3	Be able to design applications that display graphic images to given specifications
Course Name: C419(CYBER LAWS AND ETHICS)	
On completion of the course,Students will be able to:	
C419.1	The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
C419.2	The students will learn the rights and responsibilities as an employee, team member and a global citizen
Course Name: C420(MARKETING MANAGEMENT)	
On completion of the course,Students will be able to :	
C420.1	Concepts of marketing management
C420.2	To analyze markets and design customer driven strategies


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C420.3	To communicate the decisions towards business development with superior customer value.
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Course Name: C421(SOFT SKILLS LAB)	
On completion of the course,Students will be able to :	
C421.1	Developed critical acumen and creative ability besides making them industry- ready.
C421.2	Appropriate use of English language while clearly articulating ideas.
Course Name: C422(ETHICAL HACKING)	
On completion of the course,Students will be able to :	
C422.1	Gain the knowledge of the use and availability of tools to support an ethical hack
C422.2	Gain the knowledge of interpreting the results of a controlled attack
C422.3	Comprehend the dangers associated with penetration testing
Course Name: C423(SOFT COMPUTING)	
On completion of the course,Students will be able to :	
C423.1	Comprehend the differences between typical scripting languages and application programming languages. Acquire programming skills using scripting languages.
C423.2	Gain knowledge of the strengths and weakness of Perl, PHP, TCL and Python; and select an appropriate language for solving a given problem
C423.3	Ability to design web pages using advanced features of PHP.
Course Name: C424(ADVANCED DATABASES)	
On completion of the course,Students will be able to :	
C424.1	Understand theoretical and practical aspects of distributed database systems.
C424.2	Study and identify various issues related to the development of distributed database system.
C424.3	Understand the design aspects of object oriented database system and related development.
Course Name: C425(INFORMATION SYSTEMS CONTROL AND AUDIT)	
On completion of the course,Students will be able to :	
C425.1	Understand function of Information Systems Audit and Management
C425.2	To acquire skills on Evidence Collection & Evaluation
Course Name: C426(IMAGE PROCESSING)	
On completion of the course,Students will be able to:	
C426.1	Demonstrate the knowledge of the basic concepts of two-dimensional signal acquisition, sampling, and quantization.
C426.2	Demonstrate the knowledge of filtering techniques.
Course Name: C427(SERVICE ORIENTED ARCHITECTURE & MICROSERVICES)	


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On completion of the course,Students will be able to :	
C427.1	Get the foundations and concepts of service based computing
C427.2	Advocate the importance and means of technology alignment with business
C427.3	Understanding the basic operational model of web services

Course Name: C428(DATA ANALYTICS LAB (Data Analytics Using R))	
On completion of the course,Students will be able to :	
C428.1	Learn basics of R language and learn how to use R to handle the files with data.
C428.2	Understand different files formats like .csv and .txt and learn how access these files.

Course Name: C429(WEB PROGRAMMING & TESTING TOOLS LAB)	
On completion of the course,Students will be able to :	
C429.1	Design and develop interactive and dynamic web applications using HTML, CSS, JavaScript and XML
C429.2	Apply client-server principles to develop scalable and enterprise web applications.

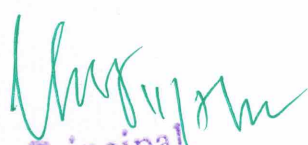
Course Name: C430(COMPUTER ORGANIZATION)	
On completion of the course,Students will be able to :	
C430.1	After this course students understand in a better way the I/O and memory organization in depth.
C430.2	They should be in a position to write assembly language programs for various applications.

Course Name: C431(COMPUTER ORGANIZATION LAB)	
On completion of the course,Students will be able to :	
C431.1	To write assembly language programs (8086 processor) for solving problems.

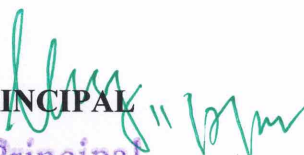
Course Name: C432(OBJECT ORIENTED PROGRAMMING THROUGH C++)	
On completion of the course,Students will be able to :	
C432.1	To get practical exposure on C++ basics.

Course Name: C433(Data Structures Lab Using C++)	
On completion of the course,Students will be able to:	
C433.1	Ability to select the data structures that efficiently model the information in a problem.
C433.2	Ability to assess efficiency trade-offs among different data structure implementations or combinations.

Course Name: C434(OBJECT ORIENTED ANALYSIS AND DESIGN USING UML)	
On completion of the course,Students will be able to :	
C434.1	Will be able to use UML notations
C434.2	Can apply unified process in software development
C434.3	Will be able to perform analysis and design using object modeling


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Course Name: C435(SOFTWARE PROCESS AND PROJECT MANAGEMENT)	
On completion of the course,Students will be able to :	
C435.1	To describe and determine the purpose and importance of project management from the perspectives of planning, tracking and completion of project.
C435.2	To compare and differentiate organization structures and project structures.
Course Name: C436(SEMANTIC WEB AND SOCIAL NETWORKS)	
On completion of the course,Students will be able to :	
C436.1	To learn Web Intelligence
C436.2	To learn Knowledge Representation for the Semantic Web


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