MAM SCHOOL OF ENGINEERING

SIRUGANUR, TRICHY-621105

PROGRAM OUTCOMES

B.E. AERONAUTICAL ENGINEERING (R – 2017)

PROGRAMME OUTCOMES:

- Ability to solve the engineering problems of mathematics, science and engineering
- An engineering acumen in identifying, formulating, analyzing and solving complex engineering problems.
- Developing processes, solutions to the problems which are safe socially, culturally and environmentally.
- Ability to model, analyze and simulate operations of aircraft components and parts.
- Capability of exhibiting sound theoretical and practical knowledge in core domains like aircraft structures, aerodynamics and propulsion and are able to solve problems related to airflow over fixed and rotary wing aircrafts.
- Understanding of the impact of engineering solutions in a global, economic, environmental, and societal context
- An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
- Commitment to professional ethics and responsibilities and norms as prescribed by the Aviation bodies such as DGCA etc.
- Ability to work in team and have practical exposure in modeling of UAV, hovercrafts etc.
- Ability to communicate effectively with the aerospace community using reports, presentations and documentations.
- Ability to manage the projects in various aerospace fields of structure, propulsion, avionics etc.
- A readiness to engage in lifelong learning and understanding of contemporary issues in aviation industry.

27/11/19

MAM SCHOOL OF ENGINEERING
SIRUGANUR, TRICHY-621105
COURSE OUTCOMES
B.E. AERONAUTICAL ENGINEERING (R – 2017)
I SEM

S.No	Sub code	Sub name	Outcomes
1	HS8251	TECHNICAL ENGLISH	□ Read technical texts and write area- specific texts effortlessly. □ Listen and comprehend lectures and talks in their area of specialisation successfully. □ Speak appropriately and effectively in varied formal and informal contexts. □ Write reports and winning job applications.
2	MA8251	ENGINEERING MATHEMATICS – II	□ Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices. □ Gradient, divergence and curl of a vector point function and related identities. □ Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification. □ Analytic functions, conformal mapping and complex integration. □ Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.
3	PH8251	MATERIALS SCIENCE	□ the students will have knowledge on the various phase diagrams and their applications □ the students will acquire knowledge on Fe-Fe3C phase diagram, various microstructures and alloys □ the students will get knowledge on mechanical properties of materials and their measurement □ the students will gain knowledge on magnetic, dielectric and superconducting properties of materials □ the students will understand the basics of ceramics, composites and nanomaterials.
4	BE8253	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING	□ Understand electric circuits and working principles of electrical machines □ Understand the concepts of various electronic devices □ Choose appropriate instruments for electrical measurement for a specific application
5	GE8291	ENVIRONMENTAL SCIENCE AND ENGINEERING	□ Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. □ Public awareness of environmental is at infant stage. □ Ignorance and incomplete knowledge has lead to misconceptions □ Development and improvement in std. of living has lead to serious environmental disasters
6	GE8292	ENGINEERING MECHANICS	□ illustrate the vectorial and scalar representation of forces and moments □ analyse the rigid body in equilibrium □ evaluate the properties of surfaces and solids □ calculate dynamic forces exerted in rigid body □ determine the friction and the effects by the laws of friction
7	GE8261	ENGINEERING PRACTICES LABORATORY	□ fabricate carpentry components and pipe connections including plumbing works. □ use welding equipments to join the structures. □ Carry out the basic machining operations

			□ Make the models using sheet metal works □ Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings □ Carry out basic home electrical works and appliances □ Measure the electrical quantities □ Elaborate on the components, gates, soldering practices.
8	BE8261	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING LABORATORY	□ Ability to determine the speed characteristic of different electrical machines □ Ability to design simple circuits involving diodes and transistors □ Ability to use operational amplifiers

II SEM

S.No	Sub code	Sub name	Outcomes
1	HS8251	TECHNICAL ENGLISH	□ Read technical texts and write area- specific texts effortlessly. □ Listen and comprehend lectures and talks in their area of specialisation successfully. □ Speak appropriately and effectively in varied formal and informal contexts. □ Write reports and winning job applications.
2	MA8251	ENGINEERING MATHEMATICS – II	□ Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices. □ Gradient, divergence and curl of a vector point function and related identities. □ Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification. □ Analytic functions, conformal mapping and complex integration. □ Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.
3	PH8251	MATERIALS SCIENCE	□ the students will have knowledge on the various phase diagrams and their applications □ the students will acquire knowledge on Fe-Fe3C phase diagram, various microstructures and alloys □ the students will get knowledge on mechanical properties of materials and their measurement □ the students will gain knowledge on magnetic, dielectric and superconducting properties of materials □ the students will understand the basics of ceramics, composites and nanomaterials.
4	BE8253	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATION ENGINEERING	□ Understand electric circuits and working principles of electrical machines □ Understand the concepts of various electronic devices □ Choose appropriate instruments for electrical measurement for a specific application
5	GE8291	ENVIRONMENTAL SCIENCE AND ENGINEERING	□ Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. □ Public awareness of environmental is at infant stage. □ Ignorance and incomplete knowledge has lead to misconceptions □ Development and improvement in std. of living has lead to serious environmental disasters

6	GE8292	ENGINEERING MECHANICS	□ illustrate the vectorial and scalar representation of forces and moments □ analyse the rigid body in equilibrium □ evaluate the properties of surfaces and solids □ calculate dynamic forces exerted in rigid body □ determine the friction and the effects by the laws of friction
7	GE8261	ENGINEERING PRACTICES LABORATORY	□ fabricate carpentry components and pipe connections including plumbing works. □ use welding equipments to join the structures. □ Carry out the basic machining operations □ Make the models using sheet metal works □ Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings □ Carry out basic home electrical works and appliances □ Measure the electrical quantities □ Elaborate on the components, gates, soldering practices.
8	BE8261	BASIC ELECTRICAL, ELECTRONICS AND INSTRUMENTATIO N ENGINEERING LABORATORY	□ Ability to determine the speed characteristic of different electrical machines □ Ability to design simple circuits involving diodes and transistors □ Ability to use operational amplifiers

III SEM

S.No	Sub code	Sub name	Outcomes
1	MA8353	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	□ Understand how to solve the given standard partial differential equations. □ Solve differential equations using Fourier series analysis which plays a vital role in engineering applications. □ Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations. □ Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering. □ Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.
2	ME8392	MANUFACTURING TECHNOLOGY	The Students can able to use different manufacturing process and use this in industry for component production
3	AE8301	AERO ENGINEERING THERMODYNAMICS	□ Able to relate laws of thermodynamics to jet engine components. □ Understands principle operation of piston engine and jet engines. □ Able to identify efficient cycle of air and jet engines. □ Capable to illustrate condition of working medium. □ Eligible to recognize and calculate heat transfer in complex systems involving several heat transfer mechanisms.
4	CE8394	FLUID MECHANICS AND MACHINERY	□ Apply mathematical knowledge to predict the properties and characteristics of a fluid. □ Can analyse and calculate major and minor losses associated with pipe flow in piping networks. □ Can mathematically predict the nature of physical quantities □ Can critically analyse the performance of pumps □ Can critically analyse the performance of turbines.
5	CE8395	STRENGTH OF MATERIALS FOR	□ Understand the concepts of stress and strain in simple and compound bars, the

		MECHANICAL ENGINEERS	importance of principal stresses and principal planes. Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment. Apply basic equation of simple torsion in designing of shafts and helical spring Calculate the slope and deflection in beams using different methods. Analyze and design thin and thick shells for the applied internal and external pressures.
6	AE8302	ELEMENTS OF AERONAUTICAL ENGINEERING	 Learn the history of aircraft & developments over the years Ability to identify the types & classifications of components and control systems Understand the basic concepts of flight & Physical properties of Atmosphere An ability to differentiate the types of fuselage and constructions. Different types of Engines and principles of Rocket
7	CE8381	STRENGTH OF MATERIALS AND FLUID MECHANICS & MACHINERY LABORATORY	Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials. Perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials. Use the measurement equipments for flow measurement. Perform test on different fluid machinery.
8	AE8311	THERMODYNAMICS LABORATORY	 Ability to perform test on diesel/petrol engine Ability to explain the characteristics of the diesel/Petrol engine Ability to determine the properties of the fuels.
9	HS8381	INTERPERSONAL SKILLS/LISTENING & SPEAKING	 Listen and respond appropriately. Participate in group discussions Make effective presentations Participate confidently and appropriately in conversations both formal and informal

IV SEM

S.No	Sub code	Sub name	Outcomes
1	MA8491	NUMERICAL METHODS	Understand the basic concepts and techniques of solving algebraic and transcendental equations. Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations. Apply the numerical techniques of differentiation and integration for engineering problems. Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations. Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.
2	AE8401	AERODYNAMICS - I	An ability to apply airfoil theory to predict airfoil performance Analyze and optimize wing performance A knowledge of incompressible flow A knowledge of subsonic wing theory Apply propeller theory to predict blade performance An exposure to Boundary layer theory

3	AE8402	AIRCRAFT SYSTEMS AND INSTRUMENTS	Compare the features of various flight control systems. Describe the principle and working of different aircraft systems. Analyze the performance of various aircraft engine systems. Acquire and interpret data from various aircraft instruments. Identify the various cockpit controls.
4	PR8451	MECHANICS OF MACHINES	Understand the principles in the formation of mechanisms and their kinematics. Understand the construction features of Gears and Gear Trains. Understand the effect of friction in different machine elements. Understand the importance of balancing. Understand the importance of Governors and Gyroscopic effects. Understand the importance of vibration.
5	AE8403	AIRCRAFT STRUCTURES - I	Ability to perform linear static analysis of determinate and indeterminate aircraft structural components Ability to design the component using different theories of failure Calculate the response of statically indeterminate structures under various loading conditions. Calculate the reactions of structures using strain energy concept. Create a structure to carry the given load. Examine the structural failures using failure theories
6	AE8404	PROPULSION – I	To be able to apply control volume and momentum equation to estimate the forces produced by aircraft propulsion systems To be able to describe the principal figures of merit for aircraft engine To be able to describe the principal design parameters and constraints that set the performance of gas turbine engines. To apply ideal and actual cycle analysis to a gas turbine engine to relate thrust and fuel burn to component performance parameters. Understanding the workings of multistage compressor or turbine, and to be able to use velocity triangles and the Euler Turbine Equation to estimate the performance of a compressor or turbine stage.
7	ME8381	COMPUTER AIDED MACHINE DRAWING	CO1 Follow the drawing standards, Fits and Tolerances CO2 Re-create part drawings, sectional views and assembly drawings as per standards
8	AE8411	AERODYNAMICS LABORATORY	Describe the fundamental aerodynamic and geometrical properties related to external flows over airfoils, wings, and bluff bodies. Calculate the aerodynamic forces and moments experienced by airfoils, wings and bluff bodies. Use thin aerofoil theory to evaluate the performance of thin airfoils and the effects of angle of attack and camber. Use wind tunnel instrumentation to measure flow velocity and lift and drag. Visualize the flow and pressure distribution over 2D and 3D bodies by water flow and smoke methods.

V SEM

S.No	Sub code	Sub name	Outcomes
1	AE8501	Flight Dynamics	Know about the forces and moments that are acting on an aircraft, the different types of drag, drag polar, ISA, variation of thrust, power, SFC with velocity and altitude. Have understanding about performance in level flight, minimum drag and power required, climbing, gliding and turning flight, v-n diagram and load factor. Knowledge about degrees of stability, stick fixed and stick free stability,

			stability criteria, effect of fuselage and CG location, stick forces, aerodynamic balancing. Understanding about lateral control, rolling and yawing moments, static directional stability, rudder and aileron control requirements and rudder lock. Understanding about dynamic longitudinal stability, stability derivatives, modes and stability criterion, lateral and directional dynamic stability.
2	AE8502	Aircraft Structures-II	 Ability to understand loads acting an aircraft. Ability to identify& resolve the structural design& its limitations . Ability to improvise distribution their loads on aircraft member with safer limits. Ability to understand the design of low weight to high strength panel member. Ability to analyze the aircraft real structural components such as wings and fuselage.
3	AE8503	Aerodynamics-II	Calculate the compressible flow through a duct of varying cross section. Use quasi one-dimensional theory to analyze compressible flow problems. Estimate fluid properties in Rayleigh and Fanno type flows. Estimate the properties across normal and oblique shock waves. Predict the properties of hypersonic flows.
4	AE8504	Propulsion-II	Understanding ramjet and hypersonic air breathing propulsion systems. To get familiarity in rocket propulsion systems. Knowing the applications and principles of liquid and solid-liquid propulsion systems. To gain knowledge about the advanced propulsion technique used for interplanetary mission.
5	AE8505	Control Engineering	Ability to apply mathematical knowledge to model the systems and analyse the frequency domain Ability to check the stability of the both time and frequency domain Ability to solve simple pneumatic, hydraulic and thermal systems, Mechanical and electrical component analogies based problems. Ability to solve the Block diagram representation of control systems, Reduction of block diagrams, Signal flow graph and problems based on it. Ability to understand the digital control system, Digital Controllers and Digital PID Controllers.
6	OAN551	Sensors and Transducer	CO1. Expertise in various calibration techniques and signal types for sensors. CO2. Apply the various sensors in the Automotive and Mechatronics applications CO3. Study the basic principles of various smart sensors. CO4. Implement the DAQ systems with different sensors for real time applications
7	AE8511	Aircraft Srtuctures Laboratory-II	students can understand the behavior of materials subjected to various types of loadings Students will be in a position to fabricate a composite laminates.
8	AE8512	Propulsion Laboratory-II	Capable to identify components and information of piston and gas turbine engine. Able to analyze behavior of flow through ducts and jet engine components. Ability to visualize flow phenomenon in supersonic flow. Recognizes performance parameters of rocket propellants. To be able to distinguish subsonic and supersonic flow characteristics.
9	HS8581	Professional Communication	• Make effective presentations • Participate confidently in Group Discussions.

			• Attend job interviews and be successful in them. • Develop adequate Soft Skills required for the workplace

VI SEM

S.No	Sub code	Sub name	Outcomes
1	AE8601	Finite Element Methods	□ Write flow chart of finite element steps and understand the convergence of the problem □ Solve stiffness matrix for bar, beam and frame problems using suitable boundary condition. □ Plane stress and plane strain condition are used to understand 2d structures. □ Modelling of 2d and 3d structures using isoparametric elements □ Apply the concepts of finite element methods to solve fluid flow and heat transfer problems.
2	AE8602	Experimental Aerodynamics	□ Knowledge on measurement techniques in aerodynamic flow. □ Acquiring basics of wind tunnel measurement systems □ Specific instruments for flow parameter measurement like pressure, velocity. □ Use measurement techniques involved in Aerodynamic testing. □ Analyze the model measurements, Lift and drag measurements through various techniques and testing of different models. □ Apply the Wind tunnel boundary corrections and Scale effects
3	AE8603	Composite Materials and Structures	□ Understanding the mechanics of composite materials □ Ability to analyse the laminated composites for various loading eases □ Knowledge gained in manufacture of composites. □ Should analyze sandwich and laminated plates □ Should be able to construct and analysis different composite technique
4	AE8604	Experimental Stress Analysis	□ Knowledge of stress and strain measurements in loaded components. □ Acquiring information's the usage of strain gauges and photo elastic techniques of measurement . □ Formulate and solve general three dimensional problems of stress-strain analysis especially fundamental problems of elasticity. □ Analyze the strain gauge data under various loading condition by using gauge rosette method. □ Experimentally evaluate the location and size of defect in solid and composite materials by using various Non-destructive Testing methods.
5	AE8605	Aircraft Design	• Initiate the preliminary design of an aircraft starting from data collection to satisfy mission specifications; • To get familiarized with the estimation of geometric and design parameters of an airplane • Understanding the procedure involved in weight estimation, power plant selection, estimation of the performance parameters, stability aspects, design of structural components of the airplane, stability of structural elements, estimation of critical loads etc. • Initiate the design of a system, component, or process to meet requirements for aircraft systems; • Complete the design of an aircraft to a level of sufficient detail to demonstrate that it satisfies given mission specifications • Work in a multidisciplinary environment involving the integration of engineering practices in such subjects as aerodynamics, structures, propulsion, and flight mechanics

6	AE8002	Aircraft General Engineering and Maintenance Practices	□ Knowledge in various ground support system for aircraft operations □ Ability to carryout ground servicing of critical aircraft systems □ Knowledge in specifications standards of aircraft hardware systems. □ Grasp the ground handling procedures and types of equipments with special maintenance □ Ability to do shop safety, Environment cleanliness in an aircraft materials shop □ Understand the FAA airworthiness regulations and the checklist involved in each inspection of aircraft
7	AE8611	Aero Engine and Airframe Laboratory	Ability to maintain and repair the aero engines.
8	AE8612	Computer Aided Simulation Laboratory	□ Ability to Mesh various geometries and to do grid independence study. □ Simulate and analyze fluid flow for internal and external flow problems. □ Analyze the basic mechanism of different structural elements behavior. □ Analyze the variation of mechanical properties over a composite beam. □ Analyze the apparent stress distribution over structural component
9	AE8613	Aircraft Design Project - I	□ Upon completion of the Aircraft Design Project I students will be in a position to design aircraft and demonstrate the performance of the design.

VII SEM

S.No	Sub code	Sub name	Outcomes
1	GE8077	TOTAL QUALITY MANAGEMENT	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
2	AE8751	AVIONICS	□ Ability to built Digital avionics architecture □ Ability to Design Navigation system □ Ability to design and perform analysis on air system. □ Integrate avionics systems using data buses. □ Analyze the performance of various cockpit display technologies. □ Design autopilot for small aircrafts using MATLAB
3	ME8093	COMPUTATIONAL FLUID DYNAMICS	CO1 Derive the governing equations and boundary conditions for Fluid dynamics CO2 Analyze Finite difference and Finite volume method for Diffusion CO3 Analyze Finite volume method for Convective diffusion CO4 Analyze Flow field problems CO5 Explain the Turbulence models and Mesh generation techniques
4	OML751	Testing of Materials	1. Identify suitable testing technique to inspect industrial component 2. Ability to use the different technique and know its applications and limitations
5	AE8008	Vibration and Elements of Aeroelasticity	□ Gaining understanding of single and multi degree vibrating systems □ Ability to use numerical techniques for vibration problems □ Knowledge acquired in aero elasticity and fluttering. □ Differentiate types of vibrations according to dampness and particle motion. □ Solve Rayleigh and Holzer method to find natural frequency of an object. □ Understand the formation of Aileron reversal, flutter and wing divergence.
6	AE8010	Fatigue and Fracture	□ Ability to perform fatigue design □ Ability to analyse the fracture due to fatigue

			Analyze for cumulative damage due to fatigue. Analyze for crack initiation & crack growth. Analyze damage tolerant structures
7	AE8711	AIRCRAFT SYSTEMS LABORATORY	Ability to understand to procedure involved in maintenance of various air frame systems
8	AE8712	FLIGHT INTEGRATION SYSTEMS AND CONTROL LABORATORY	Ability to understand digital electronics circuits. Ability to use microprocessor in Flight control Ability to perform stability analysis
9	AE8713	AIRCRAFT DESIGN PROJECT - II	On completion of Aircraft design project II the students will be in a position to design aircraft wings, fuselage, loading gears etc., and also able to angle the design in terms of structural point of view.

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COURSE OUTCOMES
B.E. AERONAUTICAL ENGINEERING (R – 2017)
VIII Semester

S.NO	SUB CODE	SUB NAME	OUTCOMES
1	AE8012	WIND TUNNEL TECHNIQUES	• Understand the working principle of Blow down, In draft tunnels and their specifications • Knowledge about horizontal buoyancy, flow angularities while carrying out calibration • Understand the working principle of component axis balance and internal balances • Ability to carry out the smoke and tuft flow visualization procedures in WT testing
2	AE8018	AIR TRAFFIC CONTROL AND PLANNING	• Understanding the requirement of air traffic control systems and types of air traffic control system. Knowledge in flight information systems and rules of air traffic systems. • Knowledge indirection indicator systems for air navigation.
3	AE8811	PROJECT WORK	• On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

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B.E. AERONAUTICAL ENGINEERING (R – 2013)

I Semester

S.No	Sub code	Sub name	Outcomes
1	HS6151	TECHNICAL ENGLISH – I	• To enable learners of Engineering and Technology develop their basic communication skills in English. • To emphasize specially the development of speaking skills amongst learners of Engineering and Technology. • To ensure that learners use the electronic media such as internet and supplement the learning materials used in the classroom. • To inculcate the habit of reading and writing leading to effective and efficient communication.
2	MA6151	MATHEMATICS – I	• This course equips students to have basic knowledge and understanding in one fields of materials, integral and differential calculus.
3	PH6151	ENGINEERING PHYSICS – I	• The students will have knowledge on the basics of physics related to properties of matter, optics, acoustics etc., and they will apply these fundamental principles to solve practical problems related to materials used for engineering applications.
4	CY6151	ENGINEERING CHEMISTRY - I	The knowledge gained on polymer chemistry, thermodynamics. spectroscopy, phase rule and nano materials will provide a strong platform to understand the concepts on these subjects for further learning.
5	GE6151	COMPUTER PROGRAMMING	At the end of the course, the student should be able to: • Design C Programs for problems. Write and execute C programs for simple applications dictionaries. □ Read and write data from/to files in Python Programs.
6	GE6152	ENGINEERING GRAPHICS	On Completion of the course the student will be able to • perform free hand sketching of basic geometrical constructions and multiple views of objects. • do orthographic projection of lines and plane surfaces. • draw projections and solids and development of surfaces. • prepare isometric and perspective sections of simple solids.

			• demonstrate computer aided drafting.
7	GE6161	COMPUTER PRACTICES LABORATORY	At the end of the course, the student should be able to: • Apply good programming design methods for program development. • Design and implement C programs for simple applications. • Develop recursive programs.
8	GE6162	ENGINEERING PRACTICES LABORATORY	• ability to fabricate carpentry components and pipe connections including plumbing works. • ability to use welding equipments to join the structures. • ability to fabricate electrical and electronics circuits.
9	GE6163	PHYSICS AND CHEMISTRY LABORATORY – I	• The hands on exercises undergone by the students will help them to apply physics principles of optics and thermal physics to evaluate engineering properties of materials. • The students will be outfitted with hands-on knowledge in the quantitative chemical analysis of water quality related parameters.
II SEM			
1	HS6251	TECHNICAL ENGLISH II	Learners should be able to • Speak convincingly, express their opinions clearly, initiate a discussion, negotiate, argue using appropriate communicative strategies. • Write effectively and persuasively and produce different types of writing such as narration, description, exposition and argument as well as creative, critical, analytical and evaluative writing. • Read different genres of texts, infer implied meanings and critically analyse and evaluate them for ideas as well as for method of presentation. • Listen/view and comprehend different spoken excerpts critically and infer unspoken and implied meanings. .
2	MA6251	MATHEMATICS – II	• The subject helps the students to develop the fundamentals and basic concepts in vector calculus, ODE, Laplace transform and complex functions. Students will be able to solve problems

			related to engineering applications by using these techniques. •
3	PH6251	ENGINEERING PHYSICS – II	• The students will have the knowledge on physics of materials and that knowledge will be used by them in different engineering and technology applications.
4	CY6251	ENGINEERING CHEMISTRY - II	• The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.
5	GE6252	BASIC ELECTRICAL AND ELECTRONICS ENGINEERING	• ability to identify the electrical components explain the characteristics of electrical machines. • ability to identify electronics components and use of them to design circuits.
6	GE6253	ENGINEERING MECHANICS	• ability to explain the differential principles applies to solve engineering problems dealing with force, displacement, velocity and acceleration. • ability to analyse the forces in any structures. • ability to solve rigid body subjected to dynamic forces.
7	GE6261	COMPUTER AIDED DRAFTING AND MODELING LABORATORY	• ability to use the software packers for drafting and modeling • ability to create 2D and 3D models of Engineering Components
8	GE6262	PHYSICS AND CHEMISTRY LABORATORY – II	• The students will have the ability to test materials by using their knowledge of applied physics principles in optics and properties of matter. • The students will be conversant with hands-on knowledge in the quantitative chemical analysis of water quality related parameters, corrosion measurement and cement analysis.

III SEM			
1	MA6351	TRANSFORMS AND PARTIAL DIFFERENTIAL EQUATIONS	• The understanding of the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering.
2	ME6352	MANUFACTURING TECHNOLOGY	• The Students can able to use different manufacturing process and use this in industry for component production
3	AE6301	AERO ENGINEERING THERMODYNAMICS	• Apply Mathematical foundations, principles in solving thermodynamics problems. • Critically analyse the problem, and solve the problems related to heat transfer and propulsion
4	CE6451	FLUID MECHANICS AND MACHINERY	• Upon completion of this course, the students can able to apply mathematical knowledge to predict the properties and characteristics of a fluid. • Can critically analyse the performance of pumps and turbines.
5	CE6452	SOLID MECHANICS	• Solve the problems related to the structural components under various loading conditions.
6	AE6302	ELEMENTS OF AERONAUTICS	• Identify the component of Flight • Identify suitable materials for Aircraft structure • Perform basic calculation on Mechanics using Newton law for lift, drag and moment.
7	CE6315	STRENGTH OF MATERIALS LABORATORY	• Ability to perform different destructive testing • Ability to characteristic materials
8	CE6461	FLUID MECHANICS AND MACHINERY LABORATORY	• Ability to use the measurement equipments for flow measurement • Ability to do performance trust on different fluid machinery
9	AE6311	THERMODYNAMICS LABORATORY	• Ability to perform test on diesel/petrol engine • Ability to explain the characteristics of the diesel/Petrol engine

			• Ability to determine the properties of the fuels.
10	AE6312	CAM AND MANUFACTURING LABORATORY	• Ability to design and model difficult aero component and perform structural analysis using available software packages
IV SEM			
1	MA6459	NUMERICAL METHODS	• The students will have a clear perception of the power of numerical techniques, ideas and would be able to demonstrate the applications of these techniques to problems drawn from industry, management and other engineering fields.
2	AE6401	AERODYNAMICS - I	• An ability to apply airfoil theory to predict air foil perform • A knowledge of incompressible flow • An explosive to Boundary layer theory
3	AE6402	AIRCRAFT SYSTEMS AND INSTRUMENTS	• Know the operation of airplane control system, Engine system, Air conditioning and pressing system. • Know the operation of air data Instruments system
4	AT6302	MECHANICS OF MACHINES	• Upon completion of this course, the students can able to apply mathematical knowledge to predict the properties and characteristics of a fluid. • Can critically analyse the performance of pumps and turbines.
5	AE6403	AIRCRAFT STRUCTURES - I	• Ability to perform linear static analysis of determinate and indeterminate aircraft structural components • Ability to design the component using different theories of failure
6	AE6404	PROPULSION - I	• Ability to identify the engine components of jet propelled engines • Know the details of advanced Jet propulsion and hypersonic propulsion

7	AE6411	AIRCRAFT STRUCTURES LABORATORY - I	• Ability to perform non-destructive testing to predict the properties of metabolic materials used in aircraft application
8	AE6412	AERODYNAMICS LABORATORY	• Ability to use the fundamental dynamic principle in aircraft application.
9	AE6413	CAD AND AIRCRAFT COMPONENT DRAWING	• Ability to design and draw different joints and components using manual drafting method.
V SEM			
1	AE6501	FLIGHT DYNAMICS	• Ability to analyse the performance of aircraft under various Flight conditions such as take off, cruise, landing, climbing, glinding, turning and other maneuvers.
2	AE6502	AIRCRAFT STRUCTURES - II	• Ability to analyse the aircraft wings and fuselage • Ability to demonstrate the behavior of major aircraft structural components.
3	AE6503	AERODYNAMICS - II	• Understanding characterstics of fluid dlows • Knowledge gained in shock phenomenon and fluid waves. • understanding fluid flow characteristics over wings airfoils and airplanes. • Usage of wind tunnels for evaluating flow behaviours.
4	AE6504	PROPULSION - II	• Understanding various propulsion systems • Knowledge in rocket propulsion systems • Knowing the applications and principles of liquid and solid-liquid propulsion systems • Application of nuclear propulsion in rocketery
5	AE6505	CONTROL ENGINEERING	• Ability to apply mathematical knowledge to model the systems and analyse the frequency domain • Ability to check the stability of the both time and frequency domain
6	GE6351	ENVIRONMENTAL SCIENCE AND ENGINEERING	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. • Public awareness of environmental is at infant stage. • Ignorance and incomplete knowledge has lead to

			misconceptions • Development and improvement in std. of living has lead to serious environmental disasters • Know the details of advanced Jet propulsion and hypersonic propulsion
7	AE6511	AIRCRAFT STRUCTURES LABORATORY - II	• Ability to perform Bending, Torsion, Shear, Vibration test on metabolic, composite specimen
8	AE6512	PROPULSION LABORATORY	• Ability to understand details of piston and gas turbine engine • Ability to perform various testing on ducts, propellants, jet engine components
9	GE6563	COMMUNICATION SKILLS – LABORATORY BASED	At the end of the course, learners should be able to • Take international examination such as IELTS and TOEFL • Make presentations and Participate in Group Discussions. • Successfully answer questions in interviews.
VI SEM			
1	MG6851	Principles of Management	• Upon completion of the course, students will be able to have clear understanding of managerial • functions like planning, organizing, staffing, leading & controlling and have same basic • knowledge on international aspect of management
2	AE6601	Finite Element Methods	• Upon completion of this course, the Students can able to understand different mathematical • Techniques used in FEM analysis and use of them in Structural and thermal problem
3	AE6602	Vibrations and Elements of Aeroelasticity	• Gaining understanding of single and multi degree vibrating systems • Ability to use numerical techniques for vibration problems • Knowledge acquired in aero elasticity and fluttering
4	AE6603	Composite Materials and Structures	• Understanding the mechanics of composite materials • Ability to analyse the laminated composites for various loading eases • Knowledge gained in manufacture of composites
5	AE6604	Aircraft Materials and Processes	• Role of corrosion and heat treatment processes of aircraft materials • Knowledge in usage of composite materials in aircraft component design. • Exposure to high temperature materials for space applications
6	AE6002	Aircraft General Engineering and Maintenance Practices	• Knowledge in various ground support system for aircraft operations • Ability to carryout ground servicing of critical aircraft systems

			• Knowledge in specifications standards of aircraft hardware systems.
7	AE6611	Aero Engine and Airframe Laboratory	Ability to maintain and repair the areo engines.
8	AE6612	Aircraft Design Project - I	Upon completion of the Aircraft Design Project I students will be in a position to design aircraft and demonstrate the performance of the design.
9	AE6613	Computer Aided Simulation Laboratory	Use of different simulation and analysis software to simulate flow behavior and perform structural analysis
V IISEM			
1	GE6757	Total Quality Management	The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.
2	AE6701	Avionics	• Ability to built Digital avionics architecture • Ability to Design Navigation system • Ability to design and perform analysis on air system
3	ME6014	Computational Fluid Dynamics	• To create numerical modeling and its role in the field of fluid flow and heat transfer • To use the various discretization methods, solution procedures and turbulence modeling to solve flow and heat transfer problems.
4	AE6702	Experimental Stress Analysis	• Knowledge of stress and strain measurements in loaded components. • Acquiring information's the usage of strain gauges and photo elastic techniques of measurement . • Knowledge in NDT in stress analysis
5	AE6007	Fatigue and Fracture	• Ability to apply mathematical knowledge to define fatigue behaviors • Ability to perform fatigue design • Ability to analyse the fracture due to fatigue
6	AE6010	Airframe Maintenance and Repair	• Ability to identify the airframe components • Ability to perform defect investigation skill to maintain the airframe
7	AE6711	Aircraft Design Project - II	On completion of Aircraft design project II the students will be in a position to design aircraft wings, fuselage, loading gears etc., and also able to angle the design in terms of structural point of view.
8	AE6712	Aircraft System Laboratory	Ability to understand to procedure involved in maintenance of various air frame systems
9	AE6713	Flight Integration Systems and Control Laboratory	• Ability to understand digital electronics circuits. • Ability to use microprocessor in Flight control • Ability to perform stability analysis

VIII SEM			
1	AE6801	Wind Tunnel Techniques	• Ability to use various techniques of Aerodynamic data generation.
2	AE6015	Rockets and Missiles	• Knowledge in types of rockets and missiles with respect to Indian & international scenario • Gaining informations on aerodynamics of rocket and missiles • Knowledge on stages and remote control of rockets missiles
3	AE6811	PROJECT WORK	• On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

Department of Computer Science and Engineering

Program Outcomes

(Regulation – 2017)

PROGRAM EDUCATIONAL OBJECTIVES (PEOs):

To enable graduates to pursue higher education and research, or have a successful career in industries associated with Computer Science and Engineering, or as entrepreneurs. To ensure that graduates will have the ability and attitude to adapt to emerging technological changes.

PROGRAM OUTCOMES POs:

Engineering Graduates will be able to:

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

2.Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3.Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4.Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5.Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6.The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7.Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9.Individual and team work: Function effectively as an individual, andas a member or leader in diverse teams, and in multidisciplinary settings.

10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11.Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.12.Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

To analyze, design and develop computing solutions by applying foundational concepts of Computer Science and Engineering.

To apply software engineering principles and practices for developing quality software for scientific and business applications.

To adapt to emerging Information and Communication Technologies (ICT) to innovate ideas and solutions to existing/novel problems.

Course Outcomes Subject Wise – Academic Year 2019-2020

S.No.	Year/ Sem	Sub. Code	Sub. Title	Course Outcomes
1.	III/ V	MA8551	ALGEBRA AND NUMBER THEORY	Upon successful completion of the course, students should be able to: • Apply the basic notions of groups, rings, fields which will then be used to solve related problems. • Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts. • Demonstrate accurate and efficient use of advanced algebraic techniques. • Demonstrate their mastery by solving non - trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text. Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.
2.		CS8591	COMPUTER NETWORKS	On Completion of the course, the students should be able to: • Understand the basic layers and its functions in computer networks. • Evaluate the performance of a network. • Understand the basics of how data flows from one node to another. • Analyze and design routing algorithms. • Design protocols for various functions in the network. Understand the working of various application layer protocols.
3.		EC8691	MICROPROCESSORS AND MICROCONTROLLERS	At the end of the course, the students should be able to: • Understand and execute programs based on 8086 microprocessor. • Design Memory Interfacing circuits. • Design and interface I/O circuits. Design and implement 8051 microcontroller based systems.
4.		CS8501	THEORY OF COMPUTATION	Upon completion of the course, the students will be able to: • Construct automata, regular expression for any pattern. • Write Context free grammar for any construct. • Design Turing machines for any language. • Propose computation solutions using Turing machines. • Derive whether a problem is decidable or not.

S.No.	Year/ Sem	Sub. Code	Sub. Title	Course Outcomes
5.	III/ V	CS8592	OBJECT ORIENTED ANALYSIS AND DESIGN	At the end of the course, the students will be able to: • Express software design with UML diagrams • Design software applications using OO concepts. • Identify various scenarios based on software requirements • Transform UML based software design into pattern based design using design patterns Understand the various testing methodologies for OO software
6.		EC8681	MICROPROCESSORS AND MICROCONTROLLERS LABORATORY	At the end of the course, the student should be able to: • Write ALP Programmes for fixed and Floating Point and Arithmetic operations • Interface different I/Os with processor • Generate waveforms using Microprocessors • Execute Programs in 8051 Explain the difference between simulator and Emulator
7.		CS8582	OBJECT ORIENTED ANALYSIS AND DESIGN LABORATORY	Upon completion of this course, the students will be able to: •Perform OO analysis and design for a given problem specification. •Identify and map basic software requirements in UML mapping. •Improve the software quality using design patterns and to explain the rationale behind applying specific design patterns •Test the compliance of the software with the SRS.
8.		CS8581	NETWORKS LABORATORY	Upon Completion of the course, the students will be able to: •Implement various protocols using TCP and UDP. •Compare the performance of different transport layer protocols. •Use simulation tools to analyze the performance of various network protocols. •Analyze various routing algorithms. •Implement error correction codes.
9.		CS8592	OBJECT ORIENTED ANALYSIS AND DESIGN	At the end of the course, the students will be able to: Express software design with UML diagrams Design software applications using OO concepts. Identify various scenarios based on software requirements Transform UML based software design into pattern based design using design patterns Understand the various testing methodologies for OO software

S.No.	Year/ Sem	Sub. Code	Sub. Title	Course Outcomes
10.	III/ V	MA8551	ALGEBRA AND NUMBER THEORY	Upon successful completion of the course, students should be able to: • Apply the basic notions of groups, rings, fields which will then be used to solve related problems. • Explain the fundamental concepts of advanced algebra and their role in modern mathematics and applied contexts. • Demonstrate accurate and efficient use of advanced algebraic techniques. • Demonstrate their mastery by solving non - trivial problems related to the concepts, and by proving simple theorems about the, statements proven by the text. Apply integrated approach to number theory and abstract algebra, and provide a firm basis for further reading and study in the subject.
11.		CS8591	COMPUTER NETWORKS	On Completion of the course, the students should be able to: • Understand the basic layers and its functions in computer networks. • Evaluate the performance of a network. • Understand the basics of how data flows from one node to another. • Analyze and design routing algorithms. • Design protocols for various functions in the network. Understand the working of various application layer protocols.
12.		EC8691	MICROPROCESSORS AND MICROCONTROLLERS	At the end of the course, the students should be able to: • Understand and execute programs based on 8086 microprocessor. • Design Memory Interfacing circuits. • Design and interface I/O circuits. Design and implement 8051 microcontroller based systems.
13.		CS8501	THEORY OF COMPUTATION	Upon completion of the course, the students will be able to: • Construct automata, regular expression for any pattern. • Write Context free grammar for any construct. • Design Turing machines for any language. • Propose computation solutions using Turing machines. • Derive whether a problem is decidable or not.

S.No.	Year/ Sem	Sub. Code	Sub. Title	Course Outcomes
14.	III/ VI	CS8651	INTERNET PROGRAMMING	At the end of the course, the students should be able to: • Construct a basic website using HTML and Cascading Style Sheets. • Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms. • Develop server side programs using Servlets and JSP. • Construct simple web pages in PHP and to represent data in XML format. Use AJAX and web services to develop interactive web applications
15.		CS8691	ARTIFICIAL INTELLIGENCE	Upon completion of the course, the students will be able to: •Use appropriate search algorithms for any AI problem •Represent a problem using first order and predicate logic •Provide the apt agent strategy to solve a given problem •Design software agents to solve a problem •Design applications for NLP that use Artificial Intelligence.
16.		CS8601	MOBILE COMPUTING	At the end of the course, the students should be able to: • Explain the basics of mobile telecommunication systems • Illustrate the generations of telecommunication systems in wireless networks • Determine the functionality of MAC, network layer and Identify a routing protocol for a given Ad hoc network • Explain the functionality of Transport and Application layers Develop a mobile application using android/blackberry/ios/Windows SDK
17.		CS8602	COMPILER DESIGN	On Completion of the course, the students should be able to: • Understand the different phases of compiler. • Design a lexical analyzer for a sample language. • Apply different parsing algorithms to develop the parsers for a given grammar. • Understand syntax-directed translation and run-time environment. • Learn to implement code optimization techniques and a simple code generator. Design and implement a scanner and a parser using LEX and YACC tools.

S.No.	Year/ Sem	Sub. Code	Sub. Title	Course Outcomes
18.	III/ VI	CS8603	DISTRIBUTED SYSTEMS	At the end of this course, the students will be able to: • Elucidate the foundations and issues of distributed systems • Understand the various synchronization issues and global state for distributed systems. • Understand the Mutual Exclusion and Deadlock detection algorithms in distributed systems • Describe the agreement protocols and fault tolerance mechanisms in distributed systems. Describe the features of peer-to-peer and distributed shared memory systems
19.		CS8661	INTERNET PROGRAMMING LABORATORY	Upon Completion of the course, the students will be able to: •Construct Web pages using HTML/XML and style sheets. •Build dynamic web pages with validation using Java Script objects and by applying different event handling mechanisms. •Develop dynamic web pages using server side scripting. •Use PHP programming to develop web applications. •Construct web applications using AJAX and web services.
20.		CS8662	MOBILE APPLICATION DEVELOPMENT LABORATORY	Upon Completion of the course, the students will be able to: •Develop mobile applications using GUI and Layouts. •Develop mobile applications using Event Listener. •Develop mobile applications using Databases. •Develop mobile applications using RSS Feed, Internal/External Storage, SMS, Multi- threading and GPS. •Analyze and discover own mobile app for simple needs.
21.		HS8581	PROFESSIONAL COMMUNICATION	At the end of the course Learners will be able to: •Make effective presentations •Participate confidently in Group Discussions. •Attend job interviews and be successful in them. •Develop adequate Soft Skills required for the workplace

16/12/2019

Signature of Head of the Department

Signature of Principal

M.A.M. School of Engineering
Siruganur, Trichy 621105.

Department of Electrical and Electronics Engineering

R – 2013

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

PROGRAM EDUCATIONAL OBJECTIVES:

1. To prepare the students have successful career in industry and motivate for higher education.
2. To provide strong foundation in basic science and mathematics necessary to formulate, solve and analyze electrical and electronics problems
3. To provide strong foundation in circuit theory, field theory, control theory and signal processing concepts.
4. To provide good knowledge of Electrical power apparatus and their applications in power systems
5. To provide knowledge on basic electronics to power electronics and their applications in power engineering
6. To provide an opportunity to work in inter disciplinary groups
7. To promote student awareness for life long learning and inculcate professional ethics
8. To provide necessary foundation on computational platforms and software applications related to the respective field of engineering.

PROGRAM OUTCOMES:

a) Ability to understand and apply differential equations, integrals, matrix theory, probability theory and Laplace, Fourier and Z transformations for engineering problems
b) Ability to understand and apply basic science, circuit theory, Electro-magnetic field theory control theory and apply them to electrical engineering problems.
c) Ability to model and analyze electrical apparatus and their application to power system
d) Ability to understand and analyze power system operation, stability, control and protection.
e) Ability to handle the engineering aspects of electrical energy generation and utilization.
f) Ability to understand and analyse, linear and digital electronic circuits.
g) Ability to review, prepare and present technological developments
h) Ability to form a group and develop or solve engineering hardware and problems
i) To understand and apply computing platform and software for engineering problems.
j) To understand ethical issues, environmental impact and acquire management skills.

Principal

M.A.M. School of Engineering
Siruganur, Trichy 621105.

Department of Electrical and Electronics Engineering

REGULATIONS – 2017
CHOICE BASED CREDIT SYSTEM

Educational Objectives

Bachelor of Electrical and Electronics Engineering curriculum is designed to prepare the graduates having attitude and knowledge to

1. Have successful technical and professional careers in their chosen fields such as circuit theory, Field theory, control theory and computational platforms.
2. Engross in life long process of learning to keep themselves abreast of new developments in the field of Electronics and their applications in power engineering.

Programme Outcomes

The graduates will have the ability to

a. Apply the Mathematical knowledge and the basics of Science and Engineering to solve the problems pertaining to Electronics and Instrumentation Engineering.
b. Identify and formulate Electrical and Electronics Engineering problems from research literature and be ability to analyze the problem using first principles of Mathematics and Engineering Sciences.
c. Come out with solutions for the complex problems and to design system components or process that fulfill the particular needs taking into account public health and safety and the social, cultural and environmental issues.
d. Draw well-founded conclusions applying the knowledge acquired from research and research methods including design of experiments, analysis and interpretation of data and synthesis of information and to arrive at significant conclusion.
e. Form, select and apply relevant techniques, resources and Engineering and IT tools for Engineering activities like electronic prototyping, modeling and control of systems and also being conscious of the limitations.
f. Understand the role and responsibility of the Professional Electrical and Electronics Engineer and to assess societal, health, safety issues based on the reasoning received from the contextual knowledge.
g. Be aware of the impact of professional Engineering solutions in societal and environmental contexts and exhibit the knowledge and the need for Sustainable Development.
h. Apply the principles of Professional Ethics to adhere to the norms of the engineering practice and to discharge ethical responsibilities.
i. Function actively and efficiently as an individual or a member/leader of different teams and multidisciplinary projects.
j. Communicate efficiently the engineering facts with a wide range of engineering community and others, to understand and prepare reports and design documents; to make effective presentations and to frame and follow instructions.
k. Demonstrate the acquisition of the body of engineering knowledge and insight and Management Principles and to apply them as member / leader in teams and multidisciplinary environments.
l. Recognize the need for self and life-long learning, keeping pace with technological challenges in the broadest sense.

Principal

S.NO	YEAR/ SEM	SUB CODE	SUB NAMES	COURSE OUTCOME
1	I/I	HS8151	Communicative English	•Read articles of a general kind in magazines and newspapers. • Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English. • Comprehend conversations and short talks delivered in English • Write short essays of a general kind and personal letters and emails in English.
2	I/I	MA8151	Engineering Mathematics - I	• Use both the limit definition and rules of differentiation to differentiate functions. • Apply differentiation to solve maxima and minima problems. • Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus. • Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables. • Evaluate integrals using techniques of integration, such as substitution, partial fractions and integration by parts. • Determine convergence/divergence of improper integrals and evaluate convergent improper integrals. • Apply various techniques in solving differential equations.
3	I/I	PH8151	Engineering Physics	• The students will gain knowledge on the basics of properties of matter and its applications, • The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics, • The students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers, • The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and

				• The students will understand the basics of crystals, their structures and different crystal growth techniques.
4	I/I	CY8151	Engineering Chemistry	• The knowledge gained on engineering materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.
5	I/I	GE8151	Problem Solving and Python Programming	• Develop algorithmic solutions to simple computational problems • Read, write, execute by hand simple Python programs. • Structure simple Python programs for solving problems. • Decompose a Python program into functions. • Represent compound data using Python lists, tuples, dictionaries. • Read and write data from/to files in Python Programs.
6	I/I	GE8152	Engineering Graphics	• Familiarize with the fundamentals and standards of Engineering graphics •Perform freehand sketching of basic geometrical constructions and multiple views of objects. • Project orthographic projections of lines and plane surfaces. • Draw projections and solids and development of surfaces. • Visualize and to project isometric and perspective sections of simple solids.
7	I/II	HS8251	Technical English	• Read technical texts and write area- specific texts effortlessly. • Listen and comprehend lectures and talks in their area of specialisation successfully. • Speak appropriately and effectively in varied formal and informal contexts. • Write reports and winning job applications.
8	I/II	MA8251	Engineering Mathematics – II	• Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices. • Gradient, divergence and curl of a vector point function and related identities. • Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification. • Analytic functions, conformal mapping and complex integration. • Laplace transform and inverse transform of

				simple functions, properties, various related theorems and application to differential equations with constant coefficients.
9	I/II	PH8253	Physics for Electronics Engineering	• Gain knowledge on classical and quantum electron theories, and energy band structuues, • Acquire knowledge on basics of semiconductor physics and its applications in various devices, • Get knowledge on magnetic and dielectric properties of materials, • Have the necessary understanding on the functioning of optical materials for optoelectronics, • Understand the basics of quantum structures and their applications in spintronics and carbon electronics.
10	I/II	BE8252	Basic Civil and Mechanical Engineering	• Appreciate the Civil and Mechanical Engineering components of Projects. • Explain the usage of construction material and proper selection of construction materials. • Measure distances and area by surveying • Identify the components used in power plant cycle. • Demonstrate working principles of petrol and diesel engine. • Elaborate the components of refrigeration and Air conditioning cycle.
11	I/II	EE8251	Circuit Theory	• Ability to analyse electrical circuits • Ability to apply circuit theorems • Ability to analyse transients
12	I/II	GE8291	Environmental Science and Engineering	• Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. • Public awareness of environmental is at infant stage. • Ignorance and incomplete knowledge has lead to misconceptions • Development and improvement in std. of living has lead to serious environmental disasters
13	II/III	MA8353	Transforms and Partial Differential Equations	• Understand how to solve the given standard partial differential equations. • Solve differential equations using Fourier series analysis which plays a vital role in engineering applications. • Appreciate the physical significance of Fourier

				series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations. • Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering. • Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.
14	II/III	EE8351	Digital Logic Circuits	• Ability to design combinational and sequential Circuits. • Ability to simulate using software package. • Ability to study various number systems and simplify the logical expressions using Boolean functions • Ability to design various synchronous and asynchronous circuits. • Ability to introduce asynchronous sequential circuits and PLDs • Ability to introduce digital simulation for development of application oriented logic circuits.
15	II/III	EE8391	Electromagnetic Theory	• Ability to understand the basic mathematical concepts related to electromagnetic vector fields. • Ability to understand the basic concepts about electrostatic fields, electrical potential, energy density and their applications. • Ability to acquire the knowledge in magneto static fields, magnetic flux density, vector potential and its applications. • Ability to understand the different methods of emf generation and Maxwell's equations • Ability to understand the basic concepts electromagnetic waves and characterizing parameters • Ability to understand and compute Electromagnetic fields and apply them for design and analysis of electrical equipment and systems
16	II/III	EE8301	Electrical Machines – I	• Ability to analyze the magnetic-circuits. • Ability to acquire the knowledge in constructional details of transformers. • Ability to understand the concepts of electromechanical energy conversion. • Ability to acquire the knowledge in working

				principles of DC Generator. • Ability to acquire the knowledge in working principles of DC Motor • Ability to acquire the knowledge in various losses taking place in D.C. Machines
17	II/III	EC8353	Electron Devices and Circuits	• Explain the structure and working operation of basic electronic devices. • Able to identify and differentiate both active and passive elements • Analyze the characteristics of different electronic devices such as diodes and transistors • Choose and adapt the required components to construct an amplifier circuit. • Employ the acquired knowledge in design and analysis of oscillators
18	II/III	ME8792	Power Plant Engineering	• Explain the layout, construction and working of the components inside a thermal power plant. • Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants. • Explain the layout, construction and working of the components inside nuclear power plants. • Explain the layout, construction and working of the components inside Renewable energy power plants. • Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.
19	II/IV	MA8491	Numerical Methods	• Understand the basic concepts and techniques of solving algebraic and transcendental equations. • Appreciate the numerical techniques of interpolation and error approximations in various intervals in real life situations. • Apply the numerical techniques of differentiation and integration for engineering problems. • Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations. • Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering

				applications.
20	II/IV	EE8401	Electrical Machines – II	• Ability to understand the construction and working principle of Synchronous Generator • Ability to understand MMF curves and armature windings. • Ability to acquire knowledge on Synchronous motor. • Ability to understand the construction and working principle of Three phase Induction Motor • Ability to understand the construction and working principle of Special Machines • Ability to predetermine the performance characteristics of Synchronous Machines.
21	II/IV	EE8402	Transmission and Distribution	• To understand the importance and the functioning of transmission line parameters. • To understand the concepts of Lines and Insulators. • To acquire knowledge on the performance of Transmission lines. • To understand the importance of distribution of the electric power in power system. • To acquire knowledge on Underground Cabilitys • To become familiar with the function of different components used in Transmission and Distribution levels of power system and modelling of these components.
22	II/IV	EE8403	Measurements and Instrumentation	• To acquire knowledge on Basic functional elements of instrumentation • To understand the concepts of Fundamentals of electrical and electronic instruments • Ability to compare between various measurement techniques • To acquire knowledge on Various storage and display devices • To understand the concepts Various transducers and the data acquisition systems • Ability to model and analyze electrical and electronic Instruments and understand the operational features of display Devices and Data Acquisition System.
23	II/IV	EE8451	Linear Integrated Circuits and Applications	• Ability to acquire knowledge in IC fabrication procedure • Ability to analyze the characteristics of Op-Amp • To understand the importance of Signal analysis using Op-amp based circuits.

				• Functional blocks and the applications of special ICs like Timers, PLL circuits, regulator Circuits. • To understand and acquire knowledge on the Applications of Op-amp • Ability to understand and analyse, linear integrated circuits their Fabrication and Application.
24	II/IV	IC8451	Control Systems	• Ability to develop various representations of system based on the knowledge of Mathematics, Science and Engineering fundamentals. • Ability to do time domain and frequency domain analysis of various models of linear system. • Ability to interpret characteristics of the system to develop mathematical model. • Ability to design appropriate compensator for the given specifications. • Ability to come out with solution for complex control problem. • Ability to understand use of PID controller in closed loop system.
25	III/V	EE8501	Power System Analysis	• Ability to model the power system under steady state operating condition •Ability to understand and apply iterative techniques for power flow analysis •Ability to model and carry out short circuit studies on power system •Ability to model and analyze stability problems in power system •Ability to acquire knowledge on Fault analysis. •Ability to model and understand various power system components and carry out power flow, short circuit and stability studies.
26	III/V	EE8551	Microprocessors And Microcontrollers	•Ability to acquire knowledge in Addressing modes & instruction set of 8085 & 8051. •Ability to need & use of Interrupt structure 8085 & 8051. •Ability to understand the importance of Interfacing •Ability to explain the architecture of Microprocessor and Microcontroller. •Ability to write the assembly language programme. •Ability to develop the Microprocessor and Microcontroller based applications.
27	III/V	EE8552	Power Electronics	•Ability to analyse AC-AC and DC-DC and DC-AC converters.

				•Ability to choose the converters for real time applications.
28	III/V	EE8591	Digital Signal Processing	•Ability to understand the importance of Fourier transform, digital filters and DS Processors. •Ability to acquire knowledge on Signals and systems & their mathematical representation. •Ability to understand and analyze the discrete time systems. •Ability to analyze the transformation techniques & their computation. •Ability to understand the types of filters and their design for digital implementation. •Ability to acquire knowledge on programmability digital signal processor & quantization effects.
29	III/V	CS8392	Object Oriented Programming	•Develop Java programs using OOP principles •Develop Java programs with the concepts inheritance and interfaces •Build Java applications using exceptions and I/O streams •Develop Java applications with threads and generics classes •Develop interactive Java programs using swings
30	III/V	OAN551	Sensors and Transducers	•Expertise in various calibration techniques and signal types for sensors. •Apply the various sensors in the Automotive and Mechatronics applications •Study the basic principles of various smart sensors. •Implement the DAQ systems with different sensors for real time applications
31	III/VI	EE8601	Solid State Drives	•Ability to understand and suggest a converter for solid state drive. •Ability to select suitability drive for the given application. •Ability to study about the steady state operation and transient dynamics of a motor load system. •Ability to analyze the operation of the converter/chopper fed dc drive. •Ability to analyze the operation and performance of AC motor drives. •Ability to analyze and design the current and speed controllers for a closed loop solid state DC motor drive.
32	III/VI	EE8602	Protection and Switchgear	•Ability to understand and analyze Electromagnetic and Static Relays. •Ability to suggest suitability circuit breaker. •Ability to find the causes of abnormal

				operating conditions of the apparatus and system. •Ability to analyze the characteristics and functions of relays and protection schemes. •Ability to study about the apparatus protection, static and numerical relays. •Ability to acquire knowledge on functioning of circuit breaker.
33	III/VI	EE8691	Embedded Systems	•Ability to understand and analyze Embedded systems. •Ability to suggest an embedded system for a given application. •Ability to operate various Embedded Development Strategies •Ability to study about the bus Communication in processors. •Ability to acquire knowledge on various processor scheduling algorithms. •Ability to understand basics of Real time operating system.
34	III/VI	GE8075	Intellectual Property Rights	•Ability to manage Intellectual Property portfolio to enhance the value of the firm.
35	III/VI	RO8591	Principles of Robotics	•Ability to understand basic concept of robotics. •To analyze Instrumentation systems and their applications to various •To know about the differential motion add statics in robotics •To know about the various path planning techniques. •To know about the dynamics and control in robotics industries.
37	IV/VII	EE6701	High Voltage Engineering	• Ability to understand and analyze power system operation, stability, control and protection.
38	IV/VII	EE6702	Protection and Switchgear	•Ability to understand and analyze power system operation, stability, control and protection.
39	IV/VII	EE6703	Special Electrical Machines	• Ability to model and analyze electrical apparatus and their application to power system
40	IV/VII	MG6851	Principles of Management	• Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management.
41	IV/VII	EI6703	Fibre Optics and Laser Instruments	• Ability to understand and analyze Instrumentation systems and their applications to various industries.
42	IV/VII	EE6007	Micro Electro	• Ability to understand the operation of micro

			Mechanical Systems	devices, micro systems and their applications. •Ability to design the micro devices, micro systems using the MEMS fabrication process.
43	IV/VIII	EE6801	Electric Energy Generation, Utilization and Conservation	• Ability to understand and analyze power system operation, stability, control and protection. • Ability to handle the engineering aspects of electrical energy generation and utilization.
44	IV/VIII	IC6003	Principles of Robotics	•Ability to understand and analyze Instrumentation systems and their applications to various industries.
45	IV/VIII	GE6757	Total Quality Management	• The student would be able to apply the tools and techniques of quality management to Manufacturing and services processes.

HOD/EEE

Principal

M.A.M SCHOOL OF ENGINEERING,TRICHY
ANNA UNIVERSITY, CHENNAI AFFILIATED INSTITUTIONS
B.E. ELECTRONICS AND COMMUNICATION ENGINEERING
REGULATIONS – 2017

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO1: To enable graduates to pursue research, or have a successful career in academia or industries associated with Electronics and Communication Engineering, or as entrepreneurs.

PEO2: To provide students with strong foundational concepts and also advanced techniques and tools in order to enable them to build solutions or systems of varying complexity.

PEO3: To prepare students to critically analyze existing literature in an area of specialization and ethically develop innovative and research oriented methodologies to solve the problems identified.

PROGRAMME OUTCOMES:

Engineering Graduates will be able to:

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

2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OBJECTIVES (PSOs)

1. To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.
2. To apply design principles and best practices for developing quality products for scientific and business applications.
3. To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems.

PROGRAM SPECIFIC OUTCOME

1. To analyze, design and develop solutions by applying foundational concepts of electronics and communication engineering.

2. To apply design principles and best practices for developing quality products for scientific and business applications.

3. To adapt to emerging information and communication technologies (ICT) to innovate ideas and solutions to existing/novel problems

H.O.D 5/6

PRINCIPAL

MAM SCHOOL OF ENGINEERING
Siruganur, Tiruchirappalli – 621 105.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

YEAR/SEM	SUBJECT CODE	SUBJECT TITLE	COURSE OUTCOME
II/III	MA8352	LINEAR ALGEBRA AND PARTIAL DIFFERENTIAL EQUATIONS	1.Explain the fundamental concepts of advanced algebra and their role in modern 38 mathematics and applied contexts. Demonstrate accurate and efficient use of advanced algebraic techniques. 2. Demonstrate their mastery by solving non - trivial problems related to the concepts and by proving simple theorems about the statements proven by the text. Able to solve various types of partial differential equations. 3.Able to solve engineering problems using Fourier series.
II/III	EC8393	FUNDAMENTALS OF DATA STRUCTURES IN C	1.Implement linear and non-linear data structure operations using C 2. Suggest appropriate linear / non-linear data structure for any given data set.• 3. Apply hashing concepts for a given problem• 4. Modify or suggest new data structure for an application 5. Appropriately choose the sorting algorithm for an application•
II/III	EC8351	ELECTRONIC CIRCUITS I	1,Acquire knowledge of Working principles, characteristics and applications of BJT and FET 2. Frequency response characteristics of BJT and FET amplifiers 3.Analyze the performance of small signal BJT and FET amplifiers - single stage and multistage amplifiers Apply the knowledge gained in the design of Electronic circuits
II/III	EC8352	SIGNALS AND SYSTEMS	1.To be able to determine if a given system is linear/causal/stable 2. Capable of determining the frequency components present in a deterministic signal 3. Capable of characterizing LTI systems in the time domain and frequency domain 4.To be able to compute the output of an LTI system in the time and frequency domains
II/III	EC8392	DIGITAL ELECTRONICS	1.Use digital electronics in the present contemporary world Design

			various combinational digital circuits using logic gates 2. Do the analysis and design procedures for synchronous and asynchronous sequential circuits Use the semiconductor memories and related technology 3. Use electronic circuits involved in the design of logic gates
II/III	EC8391	CONTROL SYSTEMS ENGINEERING	1.Identify the various control system components and their representations. Analyze the various time domain parameters 2. Analysis the various frequency response plots and its system. 3.Apply the concepts of various system stability criterions. 4.Design various transfer functions of digital control system using state variable models.
II/III	EC8381	FUNDAMENTALS OF DATA STRUCTURES IN C LABORATORY	1.Write basic and advanced programs in C Implement functions and recursive functions in C 2.Implement data structures using C 3. Choose appropriate sorting algorithm for an application and implement it in a modularized way
II/III	EC8361	ANALOG AND DIGITAL CIRCUITS LABORATORY	1.Design and Test rectifiers, filters and regulated power supplies. Design and Test BJT/JFET amplifiers. 2. Differentiate cascode and cascade amplifiers. Analyze the limitation in bandwidth of single stage and multi stage amplifier 3.Measure CMRR in differential amplifier 4. Simulate and analyze amplifier circuits using PSpice. 5.Design and Test the digital logic circuits.
II/III	HS8381	INTERPERSONAL SKILLS/LISTENING&SPEAKING	1.Listen and respond appropriately. 2. Participate in group discussions 3. Make effective presentations 4. Participate confidently and appropriately in conversations both formal and informal•
II/IV	MA8451	PROBABILITY AND RANDOM PROCESSES	1.Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon. 2.Understand the basic concepts of one and two dimensional random variables and apply in engineering applications. Apply the concept random processes in engineering disciplines.

			2. Ignorance and incomplete knowledge has lead to misconceptions 3.Development and improvement in std. of living has lead to serious environmental disasters
III/V	EC6501	DIGITAL COMMUNICATION	1. Design PCM systems 2. Design and implement base band transmission schemes 3. Design and implement band pass signaling schemes 4. Analyze the spectral characteristics of band pass signaling schemes and their noise performance 5. Design error control coding schemes
III/V	EC 6502	PRINICIPLES OF DIGITAL SIGNAL PROCESSING	1. apply DFT for the analysis of digital signals & systems 2. design IIR and FIR filters 3. characterize finite Word length effect on filters 4. design the Multirate Filters 5. apply Adaptive Filters to equalization
III/V	EC 6503	TRANSMISSION LINES AND WAVEGUIDES	1. Discuss the propagation of signals through transmission lines. 2. Analyze signal propagation at Radio frequencies. 3. Explain radio propagation in guided systems. 4. Utilize cavity resonators.
III/V	GE 6351	ENVIRONMENTAL SCIENCE AND ENGINEERING	Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. 1. Public awareness of environment at infant stage. 2. Ignorance and incomplete knowledge has lead to misconceptions. 3. Development and improvement in standard of living has lead to serious environmental disasters.
III/V	EC 6504	MICROPROCESSOR AND MICROCONTROLLER	1. Design and implement programs on 8086 microprocessor. 2. Design I/O circuits. 3. Design Memory Interfacing circuits. 4. Design and implement 8051 microcontroller based systems.
III/V	EC 6511	DIGITAL SIGNAL PROCESSING LABORATORY	1. Carry out simulation of DSP systems 2. Demonstrate their abilities towards DSP processor based implementation of DSP systems 3. Analyze Finite word length effect on DSP systems 4. Demonstrate the applications of FFT to DSP 5. Implement adaptive filters for various applications of DSP
III/V	EC 6512	COMMUNICATION SYSTEM LABORATORY	1. Simulate end-to-end Communication Link 2. Demonstrate their knowledge in base band signaling schemes through implementation of FSK, PSK and DPSK 3. Apply various channel coding schemes & demonstrate their capabilities towards the improvement of the noise performance of communication system 4. Simulate & validate the various functional modules of a communication system

			3. Understand and apply the concept of correlation and spectral densities. 4. The students will have an exposure of various distribution functions and help in acquiring skills in handling situations involving more than one variable. Able to analyze the response of random inputs to linear time invariant systems.
II/IV	EC8452	ELECTRONIC CIRCUITS II	1.Analyze different types of amplifier, oscillator and multivibrator circuits Design BJT amplifier and oscillator circuits. Analyze transistorized amplifier and oscillator circuits 2. Design and analyze feedback amplifiers 3. Design LC and RC oscillators, tuned amplifiers, wave shaping circuits,multivibrators, power amplifier and DC convertors.
II/IV	EC8491	COMMUNICATION THEORY	1.Design AM communication systems Design Angle modulated communication systems 2. Apply the concepts of Random Process to the design of Communication systems 3. Analyze the noise performance of AM and FM systems 4. Gain knowledge in sampling and quantization
II/IV	EC8451	ELECTROMAGNETIC FIELDS	1.Display an understanding of fundamental electromagnetic laws and concepts Write Maxwell's equations in integral, differential and phasor forms and explain their physical 2. meaning Explain electromagnetic wave propagation in lossy and in lossless media 3. Solve simple problems requiring estimation of electric and magnetic field quantities based on these concepts and laws
II/IV	EC8453	LINEAR INTEGRATED CIRCUITS	1.Design linear and non linear applications of OP – AMPS Design applications using analog multiplier and PLL 2.Design ADC and DAC using OP – AMPS 3. Generate waveforms using OP – AMP Circuits 4. Analyze special function ICs
II/IV	GE8291	ENVIRONMENTAL SCIENCE AND ENGINEERING	1.Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. Public awareness of environmental is at infant stage.

III/V	EC 6513	MICROPROCESSOR AND MICROCONTROLLER LABORATROY	1. Write ALP Programmes for fixed and Floating Point and Arithmetic 2. Interface different I/Os with processor 3. Generate waveforms using Microprocessors 4. Execute Programs in 8051 5. Explain the difference between simulator and Emulator
III/VI	MG6851	PRINCIPLES OF MANAGEMENT	1. Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management
III/VI	CS6303	COMPUTER ARCHITECTURE	1. Design arithmetic and logic unit. 2. Design and anlayse pipelined control units 3. Evaluate performance of memory systems. 4. Understand parallel processing architectures.
III/VI	CS 6551	COMPUTER NETWORKS	1. Identify the components required to build different types of networks 2. Choose the required functionality at each layer for given application 3. Identify solution for each functionality at each layer 4. Trace the flow of information from one node to another node in the network
III/VI	EC 6601	VLSI DESIGN	1. Explain the basic CMOS circuits and the CMOS process technology. 2. Discuss the techniques of chip design using programmable devices. 3. Model the digital system using Hardware Description Language.
III/VI	EC 6602	ANTENNA AND WAVE PROPAGATION	1. Explain the various types of antennas and wave propagation. 2. Write about the radiation from a current element. 3. Analyze the antenna arrays, aperture antennas and special antennas such as frequency independent and broad band
III/VI	EC6001	MEDICAL ELECTRONICS	1. Discuss the application of electronics in diagnostic and therapeutic area. 2. Measure biochemical and various physiological information. 3. Describe the working of units which will help to restore normal functioning.
III/VI	EC 6611	COMPUTER NETWORKS LABORATORY	1. Communicate between two desktop computers. 2. Implement the different protocols 3. Program using sockets. Implement and compare the various routing algorithms 4. Use simulation tool.
III/VI	EC 6612	VLSI DESIGN LABORATORY	1. Write HDL code for basic as well as advanced digital integrated circuits. 2. Import the logic modules into FPGA Boards. 3. Synthesize, Place and Route the digital IPs. 4. Design, Simulate and Extract the layouts of Analog IC Blocks using EDA tools.
III/VI	GE6674	COMMUNICAITON AND SOFTSKILLS LABORATORY-BASED	1. Take international examination such as IELTS and TOEFL 2. Make presentations and Participate in Group Discussions. 3. Successfully answer questions in interviews.

IV/VII	EC6701	RF AND MICROWAVE ENGINEERING	1. Explain the active & passive microwave devices & components used in Microwave communication systems. 2. Analyze the multi- port RF networks and RF transistor amplifiers. 3. Generate Microwave signals and design microwave amplifiers. 4. Measure and analyze Microwave signal and parameters.
IV/VII	EC 6702	OPTICAL COMMUNICATION AND NETWORKS	1. Discuss the various optical fiber modes, configurations and various signal degradation factors associated with optical fiber. 2. Explain the various optical sources and optical detectors and their use in the optical communication system. 3. Analyze the digital transmission and its associated parameters on system performance.
IV/VII	EC 6703	EMBEDDED AND REAL TIME SYSTEMS	1. Describe the architecture and programming of ARM processor. 2. Outline the concepts of embedded systems 3. Explain the basic concepts of real time Operating system design. 4. Use the system design techniques to develop software for embedded systems 5. Differentiate between the general purpose operating system and the real time operating system 6. Model real-time applications using embedded-system concepts
IV/VII	EC6004	SATELLITE COMMUNICATION	1. Analyze the satellite orbits. 2. Analyze the earth segment and space segment. 3. Design various satellite applications
IV/VII	EC6011	ELECTROMAGNETIC INTERFERENCE AND COMPATIBILITY	1. Find solution to EMI Sources, EMI problems in PCB level / Subsystem and system level design. 2. To measure emission immunity level from different systems to couple with the prescribed EMC standards
IV/VII	EC6016	OPTO ELECTRONIC DEVICES	1. To design display devices. 2. To design optoelectronic detection devices and modulators. 3. To design optoelectronic integrated circuits.
IV/VII	EC6711	EMBEDDED LABORATORY	1. Write programs in ARM for a specific Application 2. Interface memory and Write programs related to memory operations 3. Interface A/D and D/A convertors with ARM system 4. Analyse the performance of interrupt 5. Write programmes for interfacing keyboard, display, motor and sensor. 6. Formulate a mini project using embedded system
IV/VII	EC6712	OPTICAL AND MICROWAVE LABORATORY	1. Analyze the performance of simple optical link. 2. Test microwave and optical components. 3. Analyse the mode characteristics of fiber 4. Analyse the radiation of pattern of antenna.
IV/VII	EC6801	Wireless Communication	• Characterize wireless channels • Design and implement various signaling schemes for fading channels • Design a cellular system • Compare multipath mitigation techniques and analyze their performance

			• Design and implement systems with transmit/receive diversity and MIMO systems and analyze their performance
IV/VII	EC6802	Wireless Networks	• Conversant with the latest 3G/4G and WiMAX networks and its architecture. • Design and implement wireless network environment for any application using latest wireless protocols and standards • Implement different type of applications for smart phones and mobile devices with latest network strategies
IV/VII	CS6003	AD HOC AND SENSOR NETWORKS	1. Explain the concepts, network architectures and applications of ad hoc and wireless sensor networks 2. Analyze the protocol design issues of ad hoc and sensor networks 3. Design routing protocols for ad hoc and wireless sensor networks with respect to some protocol design issues 4. Evaluate the QoS related performance measurements of ad hoc and sensor networks
IV/VII	MG6071	ENTERPRENEURSHIP DEVELOPMENT	1. Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

H.O.D

PRINCIPAL

M.A.M. SCHOOL OF ENGINEERING

B.E. MECHANICAL ENGINEERING

REGULATIONS – 2017

COURSE OUTCOMES

PROGRAMME EDUCATIONAL OBJECTIVES:

Bachelor of Mechanical Engineering curriculum is designed to impart Knowledge, Skill and Attitude on the graduates to

1. Have a successful career in Mechanical Engineering and allied industries.
2. Have expertise in the areas of Design, Thermal, Materials and Manufacturing.
3. Contribute towards technological development through academic research and industrial practices.
4. Practice their profession with good communication, leadership, ethics and social responsibility.
5. Graduates will adapt to evolving technologies through life-long learning.

PROGRAMME

1. An ability to apply knowledge of mathematics and engineering sciences to develop mathematical models for industrial problems.
2. An ability to identify, formulates, and solve complex engineering problems. with high degree of competence.
3. An ability to design and conduct experiments, as well as to analyze and interpret data obtained through those experiments.
4. An ability to design mechanical systems, component, or a process to meet desired needs within the realistic constraints such as environmental, social, political and economic sustainability.
5. An ability to use modern tools, software and equipment to analyze multidisciplinary problems.
6. An ability to demonstrate on professional and ethical responsibilities.
7. An ability to communicate, write reports and express research findings in a scientific community.
8. An ability to adapt quickly to the global changes and contemporary practices.
9. An ability to engage in life-long learning.

ME8391-ENGINEERING THERMODYNAMICS

OUTCOMES:

Upon the completion of this course the students will be able to

Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions.

Apply second law of thermodynamics to open and closed systems and calculate entropy and availability.

Apply Rankine cycle to steam power plant and compare few cycle improvement methods

Derive simple thermodynamic relations of ideal and real gases

Calculate the properties of gas mixtures and moist air and its use in psychometric processes

CE8394-FLUID MECHANICS AND MACHINERY

OUTCOMES:

Upon completion of this course, the students will be able to

Apply mathematical knowledge to predict the properties and characteristics of a fluid.

Can analyse and calculate major and minor losses associated with pipe flow in piping networks.

Can mathematically predict the nature of physical quantities

Can critically analyse the performance of pumps

Can critically analyse the performance of turbines.

EE8353- ELECTRICAL DRIVES AND CONTROLS

OUTCOME:

- Upon Completion of this subject, the students can able to explain different types of electrical machines and their performance.

ME8492 -KINEMATICS OF MACHINERY

OUTCOMES:

Upon the completion of this course the students will be able to

Discuss the basics of mechanism
Calculate velocity and acceleration in simple mechanisms
Develop CAM profiles
Solve problems on gears and gear trains
Examine friction in machine elements

ME8451 -MANUFACTURING TECHNOLOGY – II

OUTCOMES:

Upon the completion of this course the students will be able to

Explain the mechanism of material removal processes.

Describe the constructional and operational features of centre lathe and other special purpose lathes.

Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines.

ME8491-ENGINEERING METALLURGY

OUTCOMES

Upon the completion of this course the students will be able to

Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification.
Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes.
Clarify the effect of alloying elements on ferrous and non-ferrous metals
Summarize the properties and applications of non metallic materials.
Explain the testing of mechanical properties. .

CE8395 -STRENGTH OF MATERIALS FOR MECHANICAL ENGINEERS

OUTCOMES

Students will be able to

Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes.
Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment.
Apply basic equation of simple torsion in designing of shafts and helical spring
Calculate the slope and deflection in beams using different methods.
Analyze and design thin and thick shells for the applied internal and external pressures.

ME8493-THERMAL ENGINEERING - I

OUTCOMES:

Upon the completion of this course the students will be able to

Apply thermodynamic concepts to different air standard cycles and solve problems.
Solve problems in single stage and multistage air compressors
Explain the functioning and features of IC engines, components and auxiliaries.
Calculate performance parameters of IC Engines.
Explain the flow in Gas turbines and solve problems.

ME8462-MANUFACTURING TECHNOLOGY LABORATORY – II

OUTCOMES:

Upon the completion of this course the students will be able to

use different machine tools to manufacturing gears
Ability to use different machine tools to manufacturing gears.
Ability to use different machine tools for finishing operations
Ability to manufacture tools using cutter grinder
Develop CNC part programming

ME8595-THERMAL ENGINEERING – II

OUTCOMES:

Upon the completion of this course the students will be able to

Solve problems in Steam Nozzle
Explain the functioning and features of different types of Boilers and auxiliaries and calculate performance parameters.
Explain the flow in steam turbines, draw velocity diagrams for steam turbines and solve problems.
Summarize the concept of Cogeneration, Working features of Heat pumps and Heat exchangers
Solve problems using refrigerant table / charts and psychrometric charts

ME8593-DESIGN OF MACHINE ELEMENTS

OUTCOMES:

Upon the completion of this course the students will be able to

Explain the influence of steady and variable stresses in machine component design.
Apply the concepts of design to shafts, keys and couplings.
Apply the concepts of design to temporary and permanent joints.
Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
Apply the concepts of design to bearings.

ME8501-METROLOGY AND MEASUREMENTS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Describe the concepts of measurements to apply in various metrological instruments
CO2 Outline the principles of linear and angular measurement tools used for industrial applications
CO3 Explain the procedure for conducting computer aided inspection
CO4 Demonstrate the techniques of form measurement used for industrial components
CO5 Discuss various measuring techniques of mechanical properties in industrial applications

ME8594-DYNAMICS OF MACHINES

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Calculate static and dynamic forces of mechanisms.
CO2 Calculate the balancing masses and their locations of reciprocating and rotating masses.

CO3 Compute the frequency of free vibration.
CO4 Compute the frequency of forced vibration and damping coefficient.
CO5 Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.

ME8651-DESIGN OF TRANSMISSION SYSTEMS

OUTCOMES:
Upon the completion of this course the students will be able to
CO1 apply the concepts of design to belts, chains and rope drives.
CO2 apply the concepts of design to spur, helical gears.
CO3 apply the concepts of design to worm and bevel gears.
CO4 apply the concepts of design to gear boxes .
CO5 apply the concepts of design to cams, brakes and clutches

ME8691-COMPUTER AIDED DESIGN AND MANUFACTURING

OUTCOMES:
Upon the completion of this course the students will be able to
CO1 Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics
CO2 Explain the fundamentals of parametric curves, surfaces and Solids
CO3 Summarize the different types of Standard systems used in CAD
CO4 Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines
CO5 Summarize the different types of techniques used in Cellular Manufacturing and FMS

ME8693-HEAT AND MASS TRANSFER

OUTCOMES:
Upon the completion of this course the students will be able to
CO1 Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems
CO2 Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems
CO3 Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems
CO4 Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems
CO5 Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications

ME8692-FINITE ELEMENT ANALYSIS

OUTCOMES
CO1 Summarize the basics of finite element formulation.
CO2 Apply finite element formulations to solve one dimensional Problems.
CO3 Apply finite element formulations to solve two dimensional scalar Problems.
CO4 Apply finite element method to solve two dimensional Vector problems.
CO5 Apply finite element method to solve problems on iso parametric element and dynamic Problems.

ME8694-HYDRAULICS AND PNEUMATICS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the Fluid power and operation of different types of pumps.

CO2 Summarize the features and functions of Hydraulic motors, actuators and Flow control valves

CO3 Explain the different types of Hydraulic circuits and systems

CO4 Explain the working of different pneumatic circuits and systems

CO5 Summarize the various trouble shooting methods and applications of hydraulic and pneumatic systems.

ME8682-DESIGN AND FABRICATION PROJECT

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 design and Fabricate the machine element or the mechanical product.

CO2 demonstrate the working model of the machine element or the mechanical product.

HS8581-PROFESSIONAL COMMUNICATION

OUTCOMES: At the end of the course Learners will be able to:

- Make effective presentations
- Participate confidently in Group Discussions.
- Attend job interviews and be successful in them.
- Develop adequate Soft Skills required for the workplace

ME8792-POWER PLANT ENGINEERING

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the layout, construction and working of the components inside a thermal power plant.

CO2 Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.

CO3 Explain the layout, construction and working of the components inside nuclear power plants.

CO4 Explain the layout, construction and working of the components inside Renewable energy power plants.

CO5 Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

ME8793-PROCESS PLANNING AND COST ESTIMATION

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 select the process, equipment and tools for various industrial products.

CO2 prepare process planning activity chart.

CO3 explain the concept of cost estimation.

CO4 compute the job order cost for different type of shop floor.

CO5 calculate the machining time for various machining operations.

ME8791-MECHATRONICS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.

CO2 Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.

CO3 Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing

CO4 Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.

CO5 Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies

MG8591-PRINCIPLES OF MANAGEMENT

OUTCOME:

- Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

ME8811-PROJECT WORK

OUTCOME:

- On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology.

ME8091-AUTOMOBILE ENGINEERING

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 recognize the various parts of the automobile and their functions and materials.

CO2 discuss the engine auxiliary systems and engine emission control.

CO3 distinguish the working of different types of transmission systems.

CO4 explain the Steering, Brakes and Suspension Systems.

CO5 predict possible alternate sources of energy for IC Engines.

PR8592-WELDING TECHNOLOGY

OUTCOMES:

Upon completion of this course, the students can able

- Understand the construction and working principles of gas and arc welding process.
- Understand the construction and working principles of resistance welding process.
- Understand the construction and working principles of various solid state welding process.
- Understand the construction and working principles of various special welding processes.
- Understand the concepts on weld joint design, weldability and testing of weldments.

ME8096-GAS DYNAMICS AND JET PROPULSION

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Apply the concept of compressible flows in variable area ducts.
CO2 Apply the concept of compressible flows in constant area ducts.
CO3 examine the effect of compression and expansion waves in compressible flow.
CO4 use the concept of gas dynamics in Jet Propulsion.
CO5 apply the concept of gas dynamics in Space Propulsion.

GE8075-INTELLECTUAL PROPERTY RIGHTS

OUTCOME:

- Ability to manage Intellectual Property portfolio to enhance the value of the firm.

GE8073-FUNDAMENTALS OF NANOSCIENCE

OUTCOMES:

- Will familiarize about the science of nanomaterials
- Will demonstrate the preparation of nanomaterials
- Will develop knowledge in characteristic nanomaterial

ME8071-REFRIGERATION AND AIR CONDITIONING

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the basic concepts of Refrigeration
CO2 Explain the Vapor compression Refrigeration systems and to solve problems
CO3 Discuss the various types of Refrigeration systems
CO4 Calculate the Psychrometric properties and its use in psychrometric processes
CO5 Explain the concepts of Air conditioning and to solve problems

ME8072-RENEWABLE SOURCES OF ENERGY

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Discuss the importance and Economics of renewable Energy
CO2 Discuss the method of power generation from Solar Energy
CO3 Discuss the method of power generation from Wind Energy
CO4 Explain the method of power generation from Bio Energy
CO5 Explain the Tidal energy, Wave Energy, OTEC, Hydro energy, Geothermal Energy, Fuel Cells and Hybrid Systems.

ME8073-UNCONVENTIONAL MACHINING PROCESSES

Upon the completion of this course the students will be able to

CO1 Explain the need for unconventional machining processes and its classification
CO2 Compare various thermal energy and electrical energy based unconventional machining processes.
CO3 Summarize various chemical and electro-chemical energy based unconventional machining processes.
CO4 Explain various nano abrasives based unconventional machining processes.
CO5 Distinguish various recent trends based unconventional machining processes.

MG8491-OPERATIONS RESEARCH

- Upon completion of this course, the students can able to use the optimization techniques for use engineering and Business problems

MF8071-ADDITIVE MANUFACTURING

OUTCOME:

- On completion of this course, students will learn about a working principle and construction of Additive Manufacturing technologies, their potential to support design and manufacturing, modern development in additive manufacturing process and case studies relevant to mass customized manufacturing.

GE8077-TOTAL QUALITY MANAGEMENT

OUTCOME:

- The student would be able to apply the tools and techniques of quality management to manufacturing and services processes.

ME8099-ROBOTICS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the concepts of industrial robots, classification, specifications and coordinate systems. Also summarize the need and application of robots in different sectors.

CO2 Illustrate the different types of robot drive systems as well as robot end effectors.

CO3 Apply the different sensors and image processing techniques in robotics to improve the ability of robots.

CO4 Develop robotic programs for different tasks and familiarize with the kinematics motions of robot.

CO5 Examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.

ME8095-DESIGN OF JIGS, FIXTURES AND PRESS TOOLS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Summarize the different methods of Locating Jigs and Fixtures and Clamping principles

CO2 Design and develop jigs and fixtures for given component

CO3 Discuss the press working terminologies and elements of cutting dies

CO4 Distinguish between Bending and Drawing dies.

CO5 Discuss the different types of forming techniques

ME8093-COMPUTATIONAL FLUID DYNAMICS

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Derive the governing equations and boundary conditions for Fluid dynamics

CO2 Analyze Finite difference and Finite volume methods for Diffusion

CO3 Analyze Finite volume method for Convective diffusion

CO4 Analyze Flow field problems

CO5 Explain and solve the Turbulence models and Mesh generation techniques

ME8097-NON DESTRUCTIVE TESTING AND EVALUATION

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Explain the fundamental concepts of NDT

CO2 Discuss the different methods of NDE

CO3 Explain the concept of Thermography and Eddy current testing

CO4 Explain the concept of Ultrasonic Testing and Acoustic Emission

CO5 Explain the concept of Radiography

IE8693-PRODUCTION PLANNING AND CONTROL

OUTCOMES:

- Upon completion of this course, the students can able to prepare production planning and control activities such as work study, product planning, production scheduling, Inventory Control.
- They can plan manufacturing requirements manufacturing requirement Planning (MRP II) and Enterprise Resource Planning (ERP).

MG8091-ENTREPRENEURSHIP DEVELOPMENT

OUTCOME:

- Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

ME8094-COMPUTER INTEGRATED MANUFACTURING SYSTEMS

OUTCOMES:

CO1 Explain the basic concepts of CAD, CAM and computer integrated manufacturing systems
CO2 Summarize the production planning and control and computerized process planning
CO3 Differentiate the different coding systems used in group technology
CO4 Explain the concepts of flexible manufacturing system (FMS) and automated guided vehicle (AGV) system
CO5 Classification of robots used in industrial applications

ME8074-VIBRATION AND NOISE CONTROL

OUTCOMES:

Upon the completion of this course the students will be able to

CO1 Summarize the Basics of Vibration
CO2 Summarize the Basics of Noise
CO3 Explain the Sources of Automotive Noise
CO4 Discuss the Control techniques for vibration
CO5 Describe the sources and control of Noise

EE8091-MICRO ELECTRO MECHANICAL SYSTEMS

OUTCOMES

- Ability to understand and apply basic science, circuit theory, Electro-magnetic field theory control theory and apply them to electrical engineering problems.
- Ability to understand and analyse, linear and digital electronic circuits.

GE8076-PROFESSIONAL ETHICS IN ENGINEERING

OUTCOME:

- Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society.

ME881- Project Work

- Develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same

HOD PRINCIPAL

M.A.M School of Engineering
Department of Mechanical Engineering
Course Outcomes
For Anna University Curriculum Regulation 2013

Course Name: C101 (HS6151/ TECHNICAL ENGLISH – I)	
CO	**COURSE OUTCOMES**
C101.1	Apply the collaborative and social aspects of research and writing processes
C101.2	Comprehend that research and writing is a series of tasks, including accessing, retrieving, evaluating, analyzing, and synthesizing appropriate data and information from sources that vary in content, format, structure, and scope
C101.3	Use appropriate technologies to organize, present, and communicate information to address a range of audiences, purposes, and genres.
C101.4	Explain the relationships among language, knowledge, and power including social, cultural, historical, and economic issues related to information, writing, and technology.
C101.5	Demonstrate the role of a variety of technologies/media in accessing, retrieving, managing, and communicating information.
Course Name: C102 (MA6151/ Mathematics – I)	
CO	**COURSE OUTCOMES**
C102.1	Find the Eigen values and Eigen vectors to diagonalise and reduce a matrix to quadratic form
C102.2	Check the convergences, divergences of infinite series
C102.3	Obtain the evolutes and envelopes of a given curve by using radius of curvature and center of curvature
C102.4	Calculate the maxima and minima value for functions of two variables
C102.5	Find the area of plane curves and volume of solids using double and triple integrals
Course Name: C103 (PH6151/ ENGINEERING PHYSICS I)	
CO	**COURSE OUTCOMES**
C103.1	Classify the Bravais lattices and different types of crystal structures and growth techniques
C103.2	Demonstrate the properties of elasticity and heat transfer through objects
C103.3	Explain black body radiation, properties of matter waves and Schrodinger wave equations

C103.4	Illustrate the acoustic requirements, production and application of ultrasonics.
C103.5	Examine the characteristics of laser and optical fiber
Course Name: C104 (CY6151 / ENGINEERING CHEMISTRY I)	
CO	**COURSE OUTCOMES**
C104.1	Classify the polymers and their utility in the industries and decribe the techniques of ploymerization and properties of polymers
C104.2	Relate various thermodynamic functions such as enthalpy, entropy,free energy and their importants and equilibrium constant and its significance.
C104.3	Explain the photophysical processes such as fluorescence and phospherouscence and various components of UV and IR spectrophotometer
C104.4	Illustrate the phase transistions of one compontent and two compontent systems and the types of alloys and their application in industries
C104.5	Outline the synthesis, characteristics and the applications of nano materials
Course Name: C105 (GE6151/Computer Programming)	
CO	**COURSE OUTCOMES**
C105.1	Explain the components of computer and logical operations.
C105.2	Convert the number system and their representation.
C105.3	Discuss hardware and software devices
C105.4	Summarize network fundamentals.
C105.5	Plan the logic using flowchart and develop algorithm to write a C Program.
Course Name: C106 (GE6152/Engineering Graphics)	
CO	**COURSE OUTCOMES**
C106.1	Sketch the conic sections, special curves, and draw orthographic views from pictorial views and models.
C106.2	Apply the principles of orthographic projections of points in all quadrants, lines and planes in first quadrant.
C106.3	Sketch the projections of simple solids like prisms, pyramids, cylinder and cone and obtain the traces of plane figures.

C106.4	Practice the sectional views of solids like cube, prisms, pyramids, cylinders & cones and extend its lateral surfaces.
C106.5	Sketch the perspective projection of simple solids, truncated prisms, pyramids, cone and cylinders and sketch the isometric projection of simple machine parts.

Course Name: C107 (GE6161/Computer Practices Laboratory)	
CO	**COURSE OUTCOMES**
C107.1	Prepare data using MS-word & Excel to visualize graphs, charts in MS-Excel.
C107.2	Outline the logic using flowchart for a given problem and to program using Switch case & Control structures
C107.3	Develop logic using decision making & looping statements
C107.4	Apply passing parameters using Arrays & Functions
C107.5	Construct structure and Union for a given database and to bring out the importance of Unions over structure

Course Name: C108 (GE6162/Engineering Practices Laboratory)	
CO	**COURSE OUTCOMES**
C108.1	Apply the knowledge of pipeline connections to household fittings and industrial buildings.
C108.2	Prepare the different joints in roofs, doors, windows and furniture.
C108.3	Perform step turning operation in a lathe.
C108.4	Perform the various welding processes and know about its applications.
C108.5	Produce a funnel using sheet metal.

Course Name: C109 (GE6163/Physics and Chemistry Laboratory – I)	
CO	**COURSE OUTCOMES**
C109.1	Evaluate the wavelength of spectral lines using spectrometer , the wavelength of laser, particle size, acceptance angle of an optical fiber using semiconductor diode laser.

C109.2	Appraise the velocity of sound and compressibility of the liquid using ultrasonic interferometer and thermal conductivity for bad conductors using Lee's disc apparatus.
C109.3	Determine the DO content in water sample by winkler's method and molecular weight of polymer by Ostwald viscometer.
C109.4	Find the strength of an acid using pH meter and conductometer
C109.5	Estimate the amount of weak and strong acids in a mixture by conductometer

Course Name: C110 (HS6251/Technical English – II)	
CO	**COURSE OUTCOMES**
C110.1	speak clearly, confidently, comprehensibly, and communicate with one or many listeners using appropriate communicative strategies
C110.2	Write cohesively and coherently and flawlessly avoiding grammatical errors, using a wide vocabulary range, organizing their ideas logically on a topic.
C110.3	Read different genres of texts adopting various reading strategies.
C110.4	listen/view and comprehend different spoken discourses/excerpts in different accents
C110.5	Recognize, understand, and analyze the context within which language, information, and knowledge are produced, managed, organized, and disseminated.

Course Name: C111 (MA6251/Mathematics – II)	
CO	**COURSE OUTCOMES**
C111.1	Find solenoidal, irrotational vectors and explain the concept of Green's , Gauss divergence, Stoke'stheorem to evaluate , single double and triple integrals.
C111.2	Obtain the P.I of Cauchy and Legendre Equation, explain the method of Variation of Parameters and solve simultaneous linear equations.
C111.3	Evaluate Laplace Transforms of periodic functions and solve ODE using Inverse Laplace Transform.
C111.4	Recall the properties of analytic functions for verifying C-R equations and determine Bilinear Transformation
C111.5	Expand functions of two variables as Taylor's and Laurent's series and evaluate Contour integrals using Cauchy's formula

Course Name: C112 (PH6251/Engineering Physics – II)

CO	COURSE OUTCOMES
C112.1	Illustrate Classical and Quantum free electron theory & calculate carrier concentration in metals.
C112.2	Describe the carrier concentration in semiconductors and identify the P-type & N-type semiconductor using Hall effect
C112.3	Classify the different types of magnetic and superconducting materials
C112.4	Explain the dielectrics, types of polarization, losses and breakdowns
C112.5	Discuss the properties, preparation and applications of Metallic Alloys, SMA, Nanomaterials, NLO, Biomaterials

Course Name: C113 (CY6251/Engineering Chemistry – II)	
CO	COURSE OUTCOMES
C113.1	Expalin the problems of using hard water in boilers and methods of treatment of water for boiler use.
C113.2	Design the electro chemical cells and to identify the types of corrosion and the methods of preventing
C113.3	Illustrate the methods of harnessing energy from non-conventional energy sources
C113.4	Classify various engineering materials and their importants
C113.5	Relate the significance of soild, liquid and gasous fuels and to calculate the calorific values of fuels and the requirement of air for combustion in furnaces.
Course Name: C114 (GE6252/Basic Electrical and Electronics Engineering)	
CO	COURSE OUTCOMES
C114.1	Explain the working of measuring instruments and solve the basic dc and ac circuits.
C114.2	Describe the operation of dc generators, motors, single phase induction motors and transformers.
C114.3	Clarify the working of basic electronic devices such as diode, transistor and rectifier.
C114.4	Demonstrate operation of digital devices such as logic gates, counters, flip-flops analog to digital converts and digital to analog converters.

C114.5	Justify the knowledge on working of communication systems such as radio, radar, fax and television.
Course Name: C115 (GE6261/ Engineering Mechanics)	
CO	**COURSE OUTCOMES**
C115.1	Determine the equilibrium of a particle in space using principle of laws of mechanics.
C115.2	Compute the equilibrium of rigid bodies in two dimensions and in three dimensions.
C115.3	Calculate the principal moment of inertia of plane areas.
C115.4	Solve the problems using equation of motions and analyze impact of elastic bodies on collision.
C115.5	Solve the problems of simple system with sliding friction and calculate linear and angular acceleration of moving body in general plane motion.
Course Name: C116 (GE6261/Computer Aided Drafting and Modeling Laboratory)	
CO	**COURSE OUTCOMES**
C116.1	Sketch simple figures with title block using AutoCAD software commands.
C116.2	Sketch curves like parabola, spiral and involute of square & circle and draw the orthographic projection of simple solids.
C116.3	Prepare orthographic projection of simple machine parts and draw a plan of residential building.
C116.4	Sketch simple steel truss and sectional views of simple solids.
C116.5	Prepare 2D multi view drawing from 3D model.
Course Name: C117 (GE6262/Physics and Chemistry Laboratory – II)	
CO	**COURSE OUTCOMES**
C117.1	Appraise the Young's modulus of the beam byuniform and non-uniform bending method, the moment inetria and regidity modules for thin wire Torsion pendulum
C117.2	Use Poiseuille's method for determining the coefficient of viscous city of the liquid
C117.3	Evaluate the refractive index of spectral lines for determining the dispresive power of a prism and the thickness of a thin wire through interference fringers using Air wedge apparatus.
C117.4	Determine the type, amount of alkalinity, hardness in a given water sample and evaluate the amount of copper using EDTA method.
C117.5	Examine the potentiometeric redox titration and conductometric preciption titration .

Course Name: C201(MA6351Transforms and Partial Differential Equations)	
CO	**COURSE OUTCOMES**
C 201.1	Solve first, second order homogeneous and non-homogeneous partial differential equations
C 201.2	Find the Fourier series of a given function satisfying Dirchlet's condition
C201.3	Apply Fourier series to solve one dimensional way, one and two dimensional heat equation
C201.4	Determine Fourier transform for a given function and use them to evaluate certain definite integrals
C201.5	Determine z transforms of standard functions and use them to solve difference equations.
Course Name: C202 (CE6306 Strength of Materials)	
CO	**COURSE OUTCOMES**
C202.1	Apply the principles of solid mechanics, to determine the behavior of components for applied load.
C202.2	Compute the shear force and bending moment for different types of beams with various load condition and also sketch the SF and BM diagram.
C202.3	Calculate the strain energy, stress distribution & deformation in spring and shaft.
C202.4	Use the appropriate method to determine slope and beam deflection for different beam sections.
C202.5	Solve the problem in principal planes & stresses using analytical & graphical method and determine the different types of stresses involved in thick cylinders & thin cylinders.
Course Name: C203 (ME6301Engineering Thermodynamics)	
CO	**COURSE OUTCOMES**
C203.1	Apply first law of thermodynamics for closed systems and flow process.
C203.2	Calculate thermal efficiencies of heat engine.
C203.3	Calculate work done and heat transfer for flow and non-flow process.
C 203.4	Produce TDS relations from Maxwell's relations.
C 203.5	Calculate properties of air vapor mixture using mathematical knowledge and psychrometric chart.
Course Name: C204 (CE6451Fluid Mechanics and Machinery)	
CO	**COURSE OUTCOMES**

C204.1	Calculate fluid properties and characteristics of flow using mathematical knowledge.
C204.2	Compute loses in circular conduits using conservation laws.
C204.3	Perform dimensional analysis of a given set of variables using Buckingham's π theorem and relate the model and prototype.
C204.4	Analyze the performance of pumps.
C204.5	Analyze the performance of hydraulic machines.
CourseName:C205(ME6302Manufacturing Technology – I)	
CO	**COURSE OUTCOMES**
C205.1	Explain the process of making patterns, preparation of sand mould, various special casting processes and casting defects.
C205.2	Describe various fusion, friction and special welding processes, soldering and brazing processes.
C205.3	Employ the appropriate metal forming techniques to produce components like hexagonal bolt, nut etc.,
C205.4	Illustrate the various sheet metal forming processes for a specific application.
C205.5	Describe the properties and bonding techniques of plastics and various plastic molding techniques.
Course Name: C206(EE6351Electrical Drives and Controls)	
CO	**COURSE OUTCOMES**
C206.1	Select the rating and classes of duty of machines for particular application electrical drive and draw the heating and cooling curves.
C206.2	Explain the mechanical and braking characteristics of dc and ac machines for particular application of electrical drive.
C206.3	Describe the starting methods of both dc and ac machines.
C206.4	Clarify conventional and solid state speed control of dc drives.
C206.5	Enlighten the speed control of dc and ac drive by conventional and solid state methods.
Course Name: C207(ME6311Manufacturing Technology Laboratory – I)	
CO	**COURSE OUTCOMES**
C207.1	Perform the taper turning operation for a given specification.
C207.2	Perform thread cutting operation as per the diagrams and compare with standard thread gauges.

C207.3	Calculate the eccentricity value for the required stroke length and practice eccentricity turning operation in a lathe.
C207.4	Produce square head using shaper machine as per given drawing and estimate the machining time.
C207.5	Calculate the material removal rate and perform Hexagonal head shaping on a given cylindrical work piece as per given drawing.
Course Name: C208(CE6461Fluid Mechanics and Machinery Laboratory)	
CO	**COURSE OUTCOMES**
C208.1	Calculate the coefficient of discharge for Orifice meter and Venturimeter.
C208.2	Calibrate the Rotameter and Estimate the friction factor for flow through pipes.
C208.3	Predict performance characteristics of centrifugal pump and submergible pump.
C208.4	Predict performance characteristics of reciprocating pump and gear pump.
C208.5	Predict performance characteristics of turbines.
CourseName:C209(EE6365Electrical Engineering Laboratory)	
CO	**COURSE OUTCOMES**
C209.1	Perform the load test, OCC, load characteristics and speed control ofDC shunt and DC series motor
C209.2	Perform the load test, OC and SC test on a single phase transformer
C209.3	Examine the regulation of an alternator by EMF and MMF methods
C209.4	Conduct the load test, speed control on various phase of induction motor
C209.5	Explore the DC and AC starters
Course Name: C210(MA6452Statistics and Numerical Methods)	
CO	**COURSE OUTCOMES**
C210.1	Identify small, large samples and apply testing of hypothesis.
C210.2	Apply ANOVA test to design of experiments.
C210.3	Determine the solution of algebraic and transcendal system of linear equations.
C210.4	To interpolate the values of unknown functions using Newton’s Formula

C210.5	Estimate the numerical values of the derivatives and integrals of unknown function difference equations
Course Name: C211(ME6401Kinematics of Machinery)	
CO	**COURSE OUTCOMES**
C211.1	Compute the forces and torques involved in friction drives like screw threads, clutches, belts, ropes and band and block brakes.
C211.2	Design a possible gear train and determine the speeds of simple, compound and epicyclic gear trains.
C211.3	Sketch slow speed and high speed cam profile for the required predefined motion of follower.
C211.4	Calculate kinematic properties of simple planar mechanisms using graphical approach, instantaneous center method and synthesis them at elementary level.
CO211.5	Model planar mechanisms which will have defined required motion.
Course Name: C212(ME6402Manufacturing Technology– II)	
CO	**COURSE OUTCOMES**
C212.1	Explain the mechanics of metal cutting, cutting tool materials, tool wear and cutting fluids.
C212.2	Discuss about the constructional feature of different types of lathe and their operations.
C212.3	Describe the construction & working of shaping, milling &drilling machines and gear cutting & finishing process.
C212.4	Illustrate the various types of grinding machines and broaching machines.
C212.5	Explain the construction feature of different types of CNC machine and manual part programming for a given component.
Course Name: C213(ME6403Engineering Materials and Metallurgy)	
CO	**COURSE OUTCOMES**
C213.1	Illustrate phase diagram for multicomponent systems and explain the various microstructures of steel and cast iron.
C213.2	Describe various types of heat treatment process and sketchisothermal transformation.
C213.3	Compare the composition and properties of various ferrous and non-ferrous alloys.
C213.4	Discuss properties and applications of polymers and composite materials.
C213.5	Explain various mechanical testing methods of ferrous and non-ferrous materials.
Course Name: C214(GE6351Environmental Science and Engineering)	
CO	**COURSE OUTCOMES**

C214.1	Describe the structure and functions of different eco system.
C214.2	Identify the various causes, effects and control measures of different types of pollution.
C214.3	Summarize the over exploitation and their effects of natural resources.
C214.4	Appraise the environmental issues and possible solution.
C214.5	Explain the causes of population growth and explosion.
Course Name: C215(ME6404Thermal Engineering)	
CO	**COURSE OUTCOMES**
C215.1	Calculate the mean effective pressure and air standard efficiency of different gas power cycles.
C215.2	Calculate the performance test on IC engines.
C215.3	Sketch the velocity diagrams of single and multi-stage turbines.
C215.4	Explain the classification and working principle of various types of air compressors.
C215.5	Calculate properties of moist air and COP of vapor refrigeration systems by using refrigeration table and chart.
Course Name: C216(ME6411Manufacturing Technology Laboratory–II)	
CO	**COURSE OUTCOMES**
C216.1	Demonstrate contour milling and generate a spur gear from a cylindrical work piece.
C216.2	Perform helical gear cutting operation and generate gear using hobbing machine.
C216.3	Generate gear using gear shaping machine and demonstrate plain surface grinding operation.
C216.4	Perform cylindrical grinding operation and practice Tool angle grinding with tool and Cutter Grinder.
C216.5	Measure cutting forces in Milling / Turning Process and develop CNC part programming.
Course Name: C217(ME6412Thermal Engineering Laboratory – I)	
CO	**COURSE OUTCOMES**
C217.1	Sketch the valve timing diagram and port timing diagram for single cylinder four stroke diesel engine and two stroke petrol engine.
C217.2	Calculate the mechanical efficiency of four stroke SI engine by Morse test.

C217.3	Evaluate the performance of four stroke single cylinder CI engine & Predict actual diagram.
C217.4	Evaluate the performance of steam generator and steam turbines.
C217.5	Measure the flash and fire point of various fuel/lubricants.
Course Name: C218(CE6315Strength of Materials Laboratory)	
CO	**COURSE OUTCOMES**
C218.1	Evaluate the values of yield stress, breaking stress and ultimate stress of the given specimen under tension test.
C218.2	Conduct the torsion test to determine the modulus of rigidity of given specimen.
C218.3	Justify the Rockwell hardness test over with Brinell hardness and measure the hardness of the given specimen.
C218.4	Examine the stiffness of the open coil and closed coil spring and grade them.
C218.5	Analyze the microstructure and characteristics of specimen.
Course Name: C301 (ME6501Computer Aided Design)	
CO	**COURSE OUTCOMES**
C301.1	Describe the product cycle design process, sequential and concurrent Engineering.
C 301.2	Explain the various types of curves, patches and surfaces and the constructive solid geometry with Boundary representation techniques.
C 301.3	Apply the principle of visual realism for line, surface and solid removal algorithms and Explore the techniques involved in shading and coloring.
C 301.4	Assemble the machine parts in different interfacing of positions and orientation and Calculate the mass property in the assembly modeling.
C 301.5	Appraise the uses of standard for GKS and open GL library.
Course Name: C302 (ME6502Heat and Mass Transfer)	
CO	**COURSE OUTCOMES**
C302.1	Analyze steady & unsteady heat transfer in composite systems with & without heat generation and extended surfaces.
C302.2	Calculate free and force convection heat transfer in external and internal flows.
C302.3	Describe film wise & drop wise condensation, pool & flow boiling and analyze heat exchanger using LMTD and NTU approaches.
C302.4	Analyze radiation heat transfer between surfaces using shape factor algebra.

C302.5	Analyze diffusion and convective mass transfer occurring in different applications.
Course Name: C303 (ME6503Design of Machine Elements)	
CO	**COURSE OUTCOMES**
C303.1	Apply the principle of solid mechanics to design machine member under variable loading.
C303.2	Calculate the diameter of shafts based on strength, rigidity and design various types of coupling based on application.
C303.3	Calculate design parameters of permanent and temporary joint on various loading application.
C303.4	Calculate the design parameter for energy storage element and engine components.
C303.5	Calculate the design parameters of various types of bearings.
Course Name: C304 (ME6504Metrology and Measurements)	
CO	**COURSE OUTCOMES**
C304.1	Discuss the measurement systems, units and dimensions, calibration and correction.
C304.2	Explain the various linear and angular measurement systems and understand the concept of interchangeability
C304.3	Describe the working principle of auto collimator, CMM and list the applications of them.
C304.4	Explain the various form measurements like thread, gear, straightness, flatness, roundness and surface finish.
C304.5	Discuss the working of miscellaneous measuring equipment for measuring temperature, velocity, pressure.
CourseName:C305 (ME6505 Dynamics of Machines)	
CO	**COURSE OUTCOMES**
C305.1	Explain the force-motion relationship in components subjected to external forces and analysis of standard mechanisms.
C305.2	Explain the undesirable effects of unbalances resulting from prescribed motions in mechanism.
C305.3	Calculate the natural frequencies for undamped and damped vibrating systems.
C305.4	Solve problem on effect of Dynamics of undesirable vibrations.
C305.5	Explain the principles in mechanisms used for speed control and stability control.
Course Name: C306(GE6075 Professional Ethics in Engineering)	
CO	**COURSE OUTCOMES**

C306.1	Distinguish between Moral and Ethics.
C306.2	Summarize the moral theories and ethical inquiries.
C306.3	Evaluate the result of the engineering projects by applying ethical theories.
C306.4	Discuss about professional rights, employ rights and intellectual property rights, safety and risk involved in engineering projects.
C306.5	Judge the role of engineer in environmental issues, computer applications, weapons development, multinational corporations and Corporate Social Responsibility.
Course Name: C307 (ME6511 Dynamics Laboratory)	
CO	**COURSE OUTCOMES**
C307.1	Review the various types of gears, gear trains, kinematic mechanisms, and universal joints.
C307.2	Estimate the mass moment of inertia of axisymmetric objects using Turn table apparatus, bi-filar suspension, compound pendulum and natural frequency for single and double rotor systems, equivalent spring mass system and transverse
C307.3	Inspect the critical speed of shaft under the given load conditions and the gyroscopic effect and couple on motorized gyroscope.
C307.4	Sketch the characteristic curves of Watt, Porter, Proell and Hartnell governors and motion curves for the given cam follower setup.
C307.5	Examine the balancing of rotating masses in dynamic balancing machine.
Course Name: C308(ME6512 Thermal Engineering Laboratory-II)	
CO	**COURSE OUTCOMES**
C308.1	Conduct a test to find thermal conductivity of various engineering materials.
C308.2	Measure heat transfer rate in free and forced convection environment.
C308.3	Measure emissivity of grey surface.
C308.4	Measure the effectiveness of parallel and counter flow heat exchanger.
C308.5	Measure COP of refrigeration and air conditioning system and performance of air compressor and fluidized bed cooling tower.
CourseName:C309(ME6513 Metrology and Measurements Laboratory)	
CO	**COURSE OUTCOMES**
C309.1	Check the dimensions and the dimensional deviations of given parts.

C309.2	Inspect the dimensions, angularity and parallelism of a given component.
C309.3	Construct the torque characteristic curves to various loads at various distances.
C309.4	Evaluate the straightness of surfaces and determine size of irregularities on a machined surface.
C309.5	Measure the vertical distances or height of objects, taper angle of slope for a given component, various parameters of threads and gear wheel.
CourseName:C310 (ME6601Design of Transmission Systems)	
CO	**COURSE OUTCOMES**
C310.1	Design belt drives (flat belt, V-belt), chain drives, rope drives, belt drive pulleys & chain sprockets.
C310.2	Design spur and straight helical gears based on strength and wear consideration.
C310.3	Design straight bevel gear, worm gear pair and cross helical gear.
C310.4	Design various gear boxes (sliding mesh, constant mesh, multispeed) through geometric progression, standard step ratio, ray diagram, kinematics layout.
C310.5	Design various cams, clutches, internal and external shoe brakes using basic knowledge acquired from earlier studies.
Course Name: C311 (MG6851Principles of Management)	
CO	**COURSE OUTCOMES**
C311.1	Explain the purpose of management & managerial roles in local and global organization.
C311.2	Prescribe the decision making model under different conditions.
C311.3	Explain the process of staff selection and career development.
C311.4	Demonstrate creativity and innovation, and explain the motivational theories.
C311.5	Explain the process of different types of control, and planning operations in management.
Course Name: C312 (ME6602Automobile Engineering)	
CO	**COURSE OUTCOMES**
C312.1	Explain the various types of chassis, frame and functions of IC engine parts.
C312.2	Describe the engine auxiliary system used in SI and CI engine.
C312.3	Distinguish between the manual transmission systems with automatic transmission systems.

C312.4	Demonstrate how the steering, brakes and the suspension system operate.
C312.5	Justify the importance of alternative fuels.
Course Name: C313 (ME6603Finite Element Analysis)	
CO	**COURSE OUTCOMES**
C313.1	Explain the steps involved in FEA and also the types of weight residual methods.
C313.2	Formulate FE equation for structural, heat transfer and vibration problems.
C313.3	Predict finite element equations for two dimensional thermal and torsion problems.
C313.4	Predict finite element equations for axisymmetric bodies, plate and shell.
C313.5	Apply matrix solution techniques to dynamic problems.
Course Name: C314 (ME6604Gas Dynamics Jet and Propulsion)	
CO	**COURSE OUTCOMES**
C314.1	Discuss the basic difference between incompressible flow and compressible flow and the effect of Mach number on compressible flow.
C314.2	Compare Fanno flow and Rayleigh flow and calculate the flow properties in Fanno flow and Rayleigh flow.
C314.3	Compute the Prandtl Meyer equation for shock waves.
C314.4	Compare the working of various jet engines and calculate thrust & efficiency in jet propulsion using gas dynamics principles.
C314.5	Classify rocket engines and calculate efficiency in rocket propulsion.
Course Name: C315 E1 (MG 6072Marketing Management) (Elective I)	
CO	**COURSE OUTCOMES**
C315.1	Define the marketing process, market dynamics, demands, and environment.
C315.2	Differentiate demographic, Psychographic and geographic segmentation.
C315.3	Understand the pricing methods and pricing management.
C315.4	Formulate marketing strategy and marketing process.
C315.5	Discuss the modern trends in retailing, sales promotions, e-marketing.

Course Name: C315 E2 (ME 6001Quality Control and Reliability Engineering) (Elective – I)	
CO	**COURSE OUTCOMES**
C315.1	Apply the concept of SQC in process control.
C 315.2	Categorize the process in control or out of control using various types of charts (p, np, C, U charts).
C 315.3	Identify the sampling plan suitable for the process.
C 315.4	Discuss the various parameters of life testing of components such as MTTF,MTBF.
C 315.5	Use optimization concepts in design of reliability.
Course Name: C315 E3 (ME 6002Refrigeration and Air Conditioning) (Elective – I)	
CO	**COURSE OUTCOMES**
C315.1	Explain the principle of refrigeration, cycles, properties and its environment effects.
C 315.2	Explain vapor compression systems and different processes, equipment.
C 315.3	Describe the working principle of various types of refrigeration systems.
C 315.4	Discuss psychrometric properties and processes, and air conditioning process.
C 315.5	Estimate cooling load factor, winter and summer air conditioning load and human comfort condition.
Course Name: C315 E4 (ME 6003Renewable Sources of Energy) (Elective – I)	
CO	**COURSE OUTCOMES**
C315.1	State the economics of renewable energy systems.
C 315.2	Explain the functions of Solar Cells.
C 315.3	Discuss the details of Wind Turbine Generator.
C 315.4	List out the bio – energy applications.
C 315.5	Analyze Hybrid Systems of renewable energy.

Course Name: C315 E5 (ME6004Unconventional Machining Processes) (Elective – I)	
CO	**COURSE OUTCOMES**
C315.1	Justify the needs of unconventional machining processes.
C315.2	Explain the working principles of Mechanical Energy Based Processes and various process parameters influence on their performance.
C315.3	Differentiate between Electric discharge machining and Wire cut Electric discharge machining.
C315.4	Compare the chemical machining process with electro-chemical machining process.
C315.5	Explain the working principles of thermal energy based processes.
Course Name: C316 (ME6611CAD / CAM Laboratory)	
CO	**COURSE OUTCOMES**
C316.1	Create 2D and 3D models using modeling software.
C316.2	Understand the CNC control in modern manufacturing system.
C316.3	Prepare CNC part programming and perform manufacturing.
C316.4	Create the CL Data and Post process generation using CAM packages.
C316.5	Apply CAPP in Machining and Turning Centre.
Course Name: C317 (ME6612Design and Fabrication Project)	
CO	**COURSE OUTCOMES**
C317.1	Develop conceptual and engineering design of any mechanical components and also to fabricate themusing different manufacturing tools.
Course Name: C318 (GE6563Communication Skills - Laboratory)	
CO	**COURSE OUTCOMES**
C318.1	Apply appropriate communication skills across settings, purposes, and audiences.
C318.2	Demonstrate knowledge of communication theory and application.
C318.3	Practice critical thinking to develop innovative and well-founded perspectives related to the students' emphases.
C318.4	Build and maintain healthy and effective relationships. Use technology to communicate effectively in various settings and contexts.

C318.5	Demonstrate appropriate and professional ethical behavior.
Course Name: C401 (ME6701Power Plant Engineering)	
CO	**COURSE OUTCOMES**
C401.1	Explain the various subsystems of coal power plant and calculate the efficiency of Rankine cycle.
C401.2	Discuss the merits & demerits of combined power plants and calculate the efficiency of gas power cycles.
C401.3	Differentiate pressurized water reactor & boiling water reactor and explain the various waste disposal system in nuclear power plant.
C401.4	Explain the working principle of various renewable energy power plants.
C401.5	Explain the different tariff procedures for energy consumption and differentiate fixed and operating costs involved in power production.
Course Name: C402 (ME6702Mechatronics)	
CO	**COURSE OUTCOMES**
C402.1	State the specifications of sensors and choose the suitable sensors for real time applications.
C402.2	Combine the real time control systems with peripheral devices through programmable interface techniques.
C402.3	Test the input output terminals of PLC based control system by interfacing technique.
C402.4	Construct the ladder logic circuits for simple automation system.
C402.5	Design Mechatronics system with the help of microprocessor, PLC and other electrical and electronic Circuits.
Course Name: C403 (ME6703Computer Integrated Manufacturing Systems)	
CO	**COURSE OUTCOMES**
C403.1	Describe the elements of CIM system & an automated system, Production system and mathematical models of production performance & manufacturing control.
C403.2	Discuss the use of computers in process planning, different aspects of planning system and control systems.
C403.3	Solve the simple problems in part coding system in Group Technology and quantitative analysis in cellular manufacturing.
C403.4	Discuss the flexible manufacturing system components, planning & control and Automated Guided Vehicle System.
C403.5	Discuss the Robot anatomy, related attributes, and classification of robots, robot control systems and robot part programming.
Course Name: C404 (GE6757Total Quality Management)	

CO	COURSE OUTCOMES
C404.1	Explain the importance of quality and deming philosophy of quality.
C404.2	Describe the method of continuous process improvement.
C404.3	Apply traditional & modern quality management tools and techniques to manufacturing and service processes.
C404.4	Apply statistical tools & techniques to different processes.
C404.5	Assess the implementation of ISO 9000/9001-2008/14000 for given manufacturing, service sector.
CourseName:C405E1(ME6005Process Planning and Cost Estimation) (Elective – II)	
CO	**COURSE OUTCOMES**
C405.1	Explain the methods of process planning and the various steps involved in process selection.
C405.2	Examine the various steps involved in process planning activities.
C405.3	Explain the procedure of cost estimation.
C405.4	Estimate the production cost of a given component produced in foundry shop, forging shop & welding shop.
C405.5	Calculate the machining time for different operations performed in lathe, milling, shaping, planning, drilling, boring & grinding.
Course Name: C405 E2 (ME 6006Design of Jigs, Fixtures and Press Tools) (Elective – II)	
CO	**COURSE OUTCOMES**
C405.1	Summarize the principles of locating and clamping devices in machining process.
C405.2	Design jigs and fixtures for a given component.
C405.3	Design an appropriate type of press tool for a given component.
C405.4	Develop a drawing die for a given component.
C405.5	Use computer aids for sheet metal forming analysis
Course Name: C405 E3 (ME 6007Composite Materials and Mechanics) (Elective – II)	
CO	**COURSE OUTCOMES**

C405.1	Explain lamina constitutes equation and various techniques involved in manufacturing composite.
C405.2	Solve the laminate continuity equation for various ply laminates and determine lamina stress with in composite.
C405.3	Predict the failure of laminate based on various failure theories.
C405.4	Predict the coefficient of thermal expansion to orthotropic lamina and special laminate.
C405.5	Examine laminate plate based on various testing such that buckling test, bending test and vibration measurement.
Course Name: C405 E4(ME 6008Welding Technology) (Elective – II)	
CO	**COURSE OUTCOMES**
C405.1	Compare various types of Gas and Arc welding processes.
C405.2	Explain the working principles of resistance welding process and various process parameters influence on their performance.
C405.3	Illustrate the working of various types of solid state welding processes.
C405.4	Choose the suitable welding process for aerospace, nuclear and automobile industries.
C405.5	Compare different types of Welding process for effective Welding of Aluminum, Copper, and Stainless steels.
CourseName:C405 E5 (ME 6009Energy Conservation and Management) (Elective – II)	
CO	**COURSE OUTCOMES**
C405.1	Understand and analyze the energy data of industries.
C405.2	Suggest methodologies for energy savings.
C405.3	Conduct energy accounting and balancing
C405.4	Conduct energy audit and suggest methodologies for energy savings
C405.5	Utilize the available resources in optimal ways
CourseName:C406E1(ME6010Robotics) (Elective – III)	
CO	**COURSE OUTCOMES**
C406.1	Summarize the basic concepts of industrial robotics and key components of robotics technologies.

C406.2	Summarize the robot drive systems, grippersand various end effectors.
C406.3	Describe the various sensors and image processing & data reduction method for the control of robots.
C406.4	Analyze the various kinematics of robots and prepare the robot program.
C406.5	Explain the implementations of robots in industries and analyzing robot economics.
Course Name: C406 E2 (GE 6081Fundamental of Nano Science) (Elective – III)	
CO	**COURSE OUTCOMES**
C406.1	Discuss the basics of Nano scale Science &Technology and implication in various departments.
C406.2	Explain the various methods of preparing nano-particles.
C406.3	Discuss the various methods of nano-materials preparation and discuss the properties related to applications.
C406.4	Explain the various Characterization techniques for nano materials.
C406.5	Discuss the various applications of nano-materials in engineering application.
Course Name: C406 E3 (ME 6011Thermal Turbo Machines) (Elective – III)	
CO	**COURSE OUTCOMES**
C406.1	Classify turbo machines and discuss the importance of dimensionless numbers in turbo machines.
C406.2	Discuss various losses and calculate the stage & design parameters in centrifugal fans and blowers.
C406.3	Calculate air angle, pressure ratio and power required in centrifugal compressor.
C406.4	Calculate stage losses, stage efficiency and pressure ratio in axial flow compressor.
C406.5	Calculate the flow coefficient, loading coefficient and stage parameters in axial & radial flow turbines.
Course Name: C406 E4(ME 6012Maintenance Engineering) (Elective – III)	
CO	**COURSE OUTCOMES**
C406.1	Understand the principles and objectives of Maintenance Engineering.
C406.2	Describe the various categories of maintenance.

C406.3	Discuss various condition monitoring techniques.
C406.4	Explain the repair methods of beds and slide ways.
C406.5	Explain the repair methods of material handling equipments.
CourseName:C406 E5 (EE 6007Micro Electro Mechanical Systems) (Elective – III)	
CO	**COURSE OUTCOMES**
C406.1	Understand and apply basic science, circuit theory, and Electro-magnetic field theory control theory to electrical engineering problems.
C406.2	Explain the functions of sensors.
C406.3	Discuss the functions of actuators.
C406.4	Discuss the micro machining processes.
C406.5	Analyze linear and digital electronic circuits.
CourseName:C407 (ME6711Simulation and Analysis Laboratory)	
CO	**COURSE OUTCOMES**
C407.1	Simulate simple problems in vibrations and simple mechanisms using simulation software.
C407.2	Perform analysis of stress, truss/beam and dynamic analysis of mechanical members.
C407.3	Perform two dimensional stress analysis in plate and asymmetric shells.
C407.4	Analyze the temperature distribution in one dimensional heat transfer problems (walls and fins).
C407.5	Analyze the temperature distribution in two dimensional heat transfer problems (plates and shell).
Course Name: C408 (ME6712Mechatronics Laboratory)	
CO	**COURSE OUTCOMES**
C408.1	Create the program for arithmetic functions and the program for sorting, code conversion functions.
C408.2	Formulate the program codes to interface with traffic light controller and stepper motor.
C408.3	Compare the set speed with actual speed of DC motor by interfacing suitable speed sensors.
C408.4	Integrate all the hydraulic, pneumatic and electro pneumatic circuits by using simulation software.

C408.5	Analyze the real images and template images based on image processing techniques.
Course Name: C409 (ME6713Comprehension)	
CO	**COURSE OUTCOMES**
C409	Understand and comprehend any given problem related to mechanical engineering field.
Course Name: C410 (MG6863 Engineering Economics)	
CO	**COURSE OUTCOMES**
C410.1	Learn basics of Engineering Economics and optimum costing.
C410.2	Understand Value Engineering and Time Value of Money.
C410.3	Differentiate Cash Dominated and Revenue Dominated Cash flow.
C410.4	Apply suitable cash flow methods for different Situations.
C410.5	Apply Depreciation methods for Individual/Industrial/Public Alternatives.
Course Name: C411 E1(IE6605Production Planning and Control) (Elective – IV))	
CO	**COURSE OUTCOMES**
C411.1	Describe the functions of production control, various production system, different aspects of product development and break even analysis.
C411.2	Describe the concept of Method study, Motion study and work measurement techniques.
C411.3	Perform the analysis of problems in lack of product planning, quantity determination in batch production and analysis of process capabilities in a multi product system.
C411.4	Discuss about production scheduling, production control systems, progress reporting & expediting and techniques for aligning completion times & due dates.
C411.5	Calculate the economic order quantity & economic lot size in inventory control.
Course Name: C411 E2 (MG 6071Entrepreneurship Development) (Elective – IV)	
CO	**COURSE OUTCOMES**
C411.1	Differentiate between Entrepreneur and Intrapreneur and appraise the importance of entrepreneurship in economic growth.
C411.2	Justify the need, objectives of Entrepreneurship Development Programs.
C411.3	Appraise the steps involved in setting up a business and business project reports.

C411.4	Justify the need of financing and accounting.
C411.5	Examine the government policy and assistance for the entrepreneur.
Course Name: C411 E3 (ME 6013Design of Pressure Vessels and piping) (Elective –IV)	
CO	**COURSE OUTCOMES**
C411.1	List out the various stresses induced in pressure vessels.
C411.2	Analyze various stresses induced in pressure vessels.
C411.3	Design a pressure vessel for the given conditions.
C411.4	Predict buckling and fracture of pressure vessels.
C411.5	Sketch the piping layout.
Course Name: C411 E4 (ME 6014Computational Fluid Dynamics) (Elective – IV)	
CO	**COURSE OUTCOMES**
C411.1	Model laminar and turbulent flow using conservation laws.
C411.2	Perform discretization of diffusion problems using finite difference and finite volume methods.
C411.3	Model one dimensional convection– diffusion problems.
C411.4	Solve fluid flow and heat transfer problems using SIMPLE and PISO algorithms.
C411.5	Apply different turbulence models to flow and heat transfer problems.
Course Name: C411 E5(ME 6015Operations Research) (Elective – IV)	
CO	**COURSE OUTCOMES**
C411.1	Identify and formulate LP problems using various methods for maximization and minimization problems.
C411.2	Apply mathematical techniques in different application areas of operations research like transportation and network models.
C411.3	Formulate mathematical models for quantitative analysis of Inventory control practice in industry.
C411.4	Calculate the queue length and waiting time for queuing models to make business decisions in operational research.

C411.5	Apply mathematical techniques to solve decision models using search technique and dynamic programming method.
Course Name: C412 E1 (ME6016Advanced I.C. Engines) (Elective – V)	
CO	**COURSE OUTCOMES**
C412.1	Explainfuel injection systems in SI engine, types of combustion chamber and combustion process.
C412.2	Explain different types of fuel injection system and combustion chambers of CI engine.
C412.3	Explain the mechanism of pollution formation and the evolution of emission norms.
C412.4	Describe the properties of various alternative fuels, engine modification required and emission characteristic of alternative fuels.
C412.5	Discuss various ignition methods used in I.C engine and electronic engine management system.
Course Name: C412 E2 (ME 6017Design of Heat Exchangers) (Elective –V)	
CO	**COURSE OUTCOMES**
C412.1	Discuss various types of heat exchangers and their applications.
C412.2	Analyze sizing and rating of tubular and shell & tube heat exchangers.
C412.3	Perform stress analysis of various parts of heat exchangers.
C412.4	Analyze sizing and rating of compact and plate heat exchanger.
C412.5	Apply mathematical knowledge to design condensers and cooling towers.
Course Name: C412 E3 (ME 6018 Additive Manufacturing) (Elective – V))	
CO	**COURSE OUTCOMES**
C412.1	Justify the needs of additive manufacturing technology.
C412.2	Explain the concept of data processing for additive manufacturing technology.
C412.3	Differentiate between liquid based and solid based additive manufacturing systems.
C412.4	Illustrate the process of three dimensional printing.
C412.5	Discuss bio-additive manufacturing, computer aided tissue engineering (CATE).

Course Name: C412 E4(ME 6019Non Destructive and Testing Materials) (Elective – V)	
CO	**COURSE OUTCOMES**
C412.1	Discuss the overview of Non Destructive Testing Methods for the detection of manufacturing defects as well as material characterization and its application.
C412.2	Explain the methods and procedure of Liquid Penetrate Testing and Magnetic Particle Testing.
C412.3	Explain principle and methods of Ultrasonic Testing and Acoustic Emission.
C412.4	Illustrate the basic principle and procedure of thermography and eddy current testing.
C412.5	Explain the principle and methods of radiographic testing.
Course Name: C412 E5(ME 6020Vibration and Noise Control) (Elective – V)	
CO	**COURSE OUTCOMES**
C412.1	Describe the fundamental concepts of engineering noise and vibration, measurement techniques to find natural frequency.
C412.2	Discuss the various terminology involved in production of noise, measurement and analysis of noise.
C412.3	Understand the knowledge in sources and measurement standard of noise
C412.4	Explain the fundamental mechanisms of vibration isolation,apply different solutions and calculate design parameters.
C412.5	Discuss about the sources of vibration and control methods.
Course Name: C413 (ME6811 Project Work)	
CO	**COURSE OUTCOMES**
C413	Develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same

HOD **PRINCIPAL**

R-2017 PROGRAMME OUTCOMES:

a. Will be able to apply the laws of science and mathematics to provide engineering solutions to solve complex problems.

b. Will be able to identify and analyze complex problems by modeling with the help of literature survey and validate the solution with experiments.

c. Will be able to design and develop Mechatronics systems by selecting and integrating, sensors, appropriate materials, mechanics, thermal systems, manufacturing and automation methods.

d. Will be able to collect, condition monitor and interpret data to provide engineering solutions.

e. Will be able to create applications, products as well as modernizing the existing systems by using latest tools and technologies.

f. Will be able to develop solutions for local and global requirements by applying engineering knowledge and professional ethics.

g. Will have professional values on environmental and energy consumption for sustainability.

h. Will be able to become a leader and contribute in a team with entrepreneurial qualities.

i. Will be able to interact effectively in both oral and written format.

j. Will continuously update their knowledge and skills to meet the ever changing global needs.

R-2017 PROGRAM SPECIFIC OUTCOMES (PSOs)

After the successful completion of B.E. Programme in Mechatronics Engineering, the graduates will able to

PSO1: An ability to recognize, adapt and to apply the knowledge of Mechatronics Engineering to optimize the systems and to develop techno- economical real world applications.

PSO2: Develop their skills to solve problems and assess social, environmental issues with ethics and manage different projects in multidisciplinary areas.

PSO3: Demonstrate proficiency in use of software and hardware required to practice mechatronics profession.

PSO3: An ability to comprehend the technological advancements in the usage of modern design tools to analyze and design processes for a variety of applications.

S.No	Year/Sem	Sub Code	Subject Title	Course Outcome
1	First / I	HS8151	Communicative English	• Read articles of a general kind in magazines and newspapers. • Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English. • Comprehend conversations and short talks delivered in English • Write short essays of a general kind and personal letters and emails in English.
2	First / I	MA8151	Engineering Mathematics - I	• Use both the limit definition and rules of differentiation to differentiate functions. • Apply differentiation to solve maxima and minima problems. • Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus. • Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables. • Evaluate integrals using techniques of integration, such as substitution, partial fractions

				and integration by parts. • Determine convergence/divergence of improper integrals and evaluate convergent improper integrals. • Apply various techniques in solving differential equations.
3	First / I	PH8151	Engineering Physics	• the students will gain knowledge on the basics of properties of matter and its applications, • the students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics, • the students will have adequate knowledge on the concepts of thermal properties of materials and their applications in expansion joints and heat exchangers, • the students will get knowledge on advanced physics concepts of quantum theory and its applications in tunneling microscopes, and • the students will understand the basics of crystals, their structures and different crystal growth techniques.
4	First / I	CY8151	Engineering Chemistry	• The knowledge gained on engineering

				materials, fuels, energy sources and water treatment techniques will facilitate better understanding of engineering processes and applications for further learning.
5	First / I	GE8151	Problem Solving and Python Programming	• Develop algorithmic solutions to simple computational problems • Read, write, execute by hand simple Python programs. • Structure simple Python programs for solving problems. • Decompose a Python program into functions. • Represent compound data using Python lists, tuples, dictionaries. • Read and write data from/to files in Python Programs.
6	First / I	GE8152	Engineering Graphics	• familiarize with the fundamentals and standards of Engineering graphics • perform freehand sketching of basic geometrical constructions and multiple views of objects. • project orthographic projections of lines

				and plane surfaces. • draw projections and solids and development of surfaces. • visualize and to project isometric and perspective sections of simple solids.
7	First / I	GE8261	Engineering Practices Laboratory	• fabricate carpentry components and pipe connections including plumbing works. • use welding equipments to join the structures. • Carry out the basic machining operations • Make the models using sheet metal works • Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings • Carry out basic home electrical works and appliances • Measure the electrical quantities • Elaborate on the components, gates, soldering practices.
8	First / I	BE8261	Basic Electrical, Electronics and	• Ability to determine the speed

			Instrumentation Engineering Laboratory	characteristic of different electrical machines • Ability to design simple circuits involving diodes and transistors • Ability to use operational amplifiers
9	First / II	HS8251	Technical English	• Read technical texts and write area-specific texts effortlessly. • Listen and comprehend lectures and talks in their area of specialisation successfully. • Speak appropriately and effectively in varied formal and informal contexts. • Write reports and winning job applications.
10	First / II	MA8251	Engineering Mathematics - II	• Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices. • Gradient, divergence and curl of a vector point function and related identities. • Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification. • Analytic functions, conformal mapping and complex integration.

				• Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.
11	First / II	PH8251	Materials Science	• the students will have knowledge on the various phase diagrams and their applications • the students will acquire knowledge on Fe-Fe3C phase diagram,various microstructures and alloys • the students will get knowledge on mechanical properties of materials and their measurement • the students will gain knowledge on magnetic, dielectric and superconducting properties of materials • the students will understand the basics of ceramics, composites and nanomaterials.
12	First / II	BE8253	Basic Electrical, Electronics and Instrumentation Engineering	• Understand electric circuits and working principles of electrical machines • Understand the concepts of various electronic devices • Choose appropriate instruments for

				electrical measurement for a specific application
13	First / II	GE8291	Environmental Science and Engineering	• Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course. • Public awareness of environmental is at infant stage. • Ignorance and incomplete knowledge has lead to misconceptions • Development and improvement in std. of living has lead to serious environmental disasters
14	First / II	GE8292	Engineering Mechanics	• Illustrate the vectorial and scalar representation of forces and moments • Analyse the rigid body in equilibrium • Evaluate the properties of surfaces and solids • Calculate dynamic forces exerted in rigid body • Determine the friction and the effects by

				the laws of friction
15	First / II	GE8261	Engineering Practices Laboratory	• fabricate carpentry components and pipe connections including plumbing works. • use welding equipments to join the structures. • Carry out the basic machining operations • Make the models using sheet metal works • Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundary and fittings • Carry out basic home electrical works and appliances • Measure the electrical quantities • Elaborate on the components, gates, soldering practices.
16	First / II	BE8261	Basic Electrical, Electronics and Instrumentation Engineering Laboratory	• Ability to determine the speed characteristic of different electrical machines • Ability to design simple circuits involving diodes and transistors • Ability to use operational amplifiers

17	Second / III	MA8353	Transforms and Partial Differential Equations	• Understand how to solve the given standard partial differential equations. • Solve differential equations using Fourier series analysis which plays a vital role in engineering applications. • Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations. • Understand the mathematical principles on transforms and partial differential equations would provide them the ability to formulate and solve some of the physical problems of engineering. • Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.
18	Second / III	CE8395	Strength of Materials for Mechanical Engineers	• Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes. • Understand the load transferring

				mechanism in beams and stress distribution due to shearing force and bending moment. • Apply basic equation of simple torsion in designing of shafts and helical spring • Calculate the slope and deflection in beams using different methods. • Analyze and design thin and thick shells for the applied internal and external pressures.
19	Second / III	CE8394	Fluid Mechanics and Machinery	• Apply mathematical knowledge to predict the properties and characteristics of a fluid. • Can analyse and calculate major and minor losses associated with pipe flow in piping networks. • Can mathematically predict the nature of physical quantities • Can critically analyse the performance of pumps • Can critically analyse the performance of turbines.
20	Second / III	EC8392	Digital Electronics	• Use digital electronics in the present contemporary world

				• Design various combinational digital circuits using logic gates • Do the analysis and design procedures for synchronous and asynchronous sequential circuits • Use the semiconductor memories and related technology • Use electronic circuits involved in the design of logic gates
21	Second / III	MT8301	Electrical Machines and Drives	• Get the basic knowledge about the Electric circuits and transformers. • Understand the various types of electrical motors. • Know about speed control and starting methods DC and induction motors • Understand about various types of electrical drives • Get exposure with solid state drives
22	Second / III	MT8302	Analog Devices and Circuits	• Apply the various switching devices in electronic circuits. • Work with various applications of

				amplifiers • Design various circuits using ICs. • Test and measure different parameters available in electronic circuits. • Explain the principles of various display devices.
23	Second / III	CE8381	Strength of Materials and Fluid Mechanics & Machinery Laboratory	• Ability to perform Tension, Torsion, Hardness, Compression, and Deformation test on Solid materials.
24	Second / III	MT8311	Electrical Machines and Drives Laboratory	• Test and assess the performances of the DC motors and single phase AC motor for varying load. • Control the speed of AC and DC motor. • Analyze and present the findings of experimental observations in both written and oral format.
25	Second / III	HS8381	Interpersonal Skills/Listening & Speaking	• Listen and respond appropriately. • Participate in group discussions • Make effective presentations • Participate confidently and appropriately in

				conversations both formal and informal
26	Second / IV	MA8452	Statistics and Numerical Methods	• Apply the concept of testing of hypothesis for small and large samples in real life problems. • Apply the basic concepts of classifications of design of experiments in the field of agriculture. • Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems. • Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations. • Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications
27	Second / IV	ME8392	Manufacturing Technology	• The Students can able to use different manufacturing process and use this in industry for component production
28	Second / IV	MT8491	Microprocessors and Microcontrollers	• Distinguish the feature of the 8085 microprocessor, Hardware Architecture and

				PIN diagram. • Demonstrate programming proficiency using the various addressing modes and data transfer instructions of 8085 microprocessor • Acquaint the knowledge on architecture and programming of Microcontroller 8051. • Illustrate the interrupts handling and demonstrate peripherals applications in different IC and Know about A/D and D/A converters. • Apply the programming concepts to interface the hardware units with microprocessor and Microcontroller
29	Second / IV	ME8492	Kinematics of Machinery	• Discuss the basics of mechanism • Calculate velocity and acceleration in simple mechanisms • Develop CAM profiles • Solve problems on gears and gear trains • Examine friction in machine elements

30	Second / IV	MT8401	Thermodynamics and Heat Transfer	• Understand the basic concepts associated first law of thermodynamics • Understand basic concepts associated with second law of thermodynamics • Describing the working of I.C engines and to determine its performance parameters • Basic principles of refrigeration, air conditioning and psychometric chart • Distinguishing the various modes of heat transfer and its applications
31	Second / IV	MT8411	Microprocessor and Microcontrollers Laboratory	• Solve the arithmetic operations using microcontrollers and various on-chip and off-chip interfacing and algorithms. • Design the digital and analog hardware interface for microcontroller-based systems
32	Second / IV	ME8461	Manufacturing Technology Laboratory	• Ability to use different machine tools to manufacturing gears. • Ability to use different machine tools for finishing operations • Ability to manufacture tools using cutter grinder

				• Develop CNC part programming
33	Second / IV	ME8381	Computer Aided Machine Drawing	• Follow the drawing standards, Fits and Tolerances • Re-create part drawings, sectional views and assembly drawings as per standards
34	Second / IV	HS8461	Advanced Reading and Writing	• Write different types of essays. • Write winning job applications. • Read and evaluate texts critically. • Display critical thinking in various professional contexts
35	Third/ V	EE8552	Power Electronics	• Ability to analyse AC-AC and DC-DC and DC-AC converters. • Ability to choose the converters for real time applications.
36	Third/ V	MT8591	Sensors and Instrumentation	• Familiar with various calibration techniques and signal types for sensors. • Apply the various sensors in the Automotive and Mechatronics applications • Describe the working principle and characteristics of force, magnetic and heading sensors. • Understand the basic principles of various pressure and temperature, smart sensors. • Ability to implement the DAQ systems with different sensors for real time applications.

37	Third/ V	ME8594	Dynamics of Machines	• Calculate static and dynamic forces of mechanisms. • Calculate the balancing masses and their locations of reciprocating and rotating masses. • Compute the frequency of free vibration. • Compute the frequency of forced vibration and damping coefficient. • Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.
38	Third/ V	EC8391	Control System Engineering	• Identify the various control system components and their representations. • Analyze the various time domain parameters. • Analysis the various frequency response plots and its system. • Apply the concepts of various system stability criterions. • Design various transfer functions of digital control system using state variable models.
39	Third/ V	OIM552	Lean Manufacturing	• The students will be able to identify waste in any process, reduce the waste using proper kaizens and other methods thereby improving the productivity of the organisation using LM tools.

40	Third/ V	MT8511	Power Electronics Laboratory Electronics Laboratory	• Ability to use SCR, MOSFET, TRIAC in electronic circuit • Ability to perform characteristic study on the electronics components.
41	Third/ V	MT8512	Sensors and Instrumentation Laboratory	• Generate appropriate design procedure, suitable for signal conversion to interface with computer. • Design appropriate circuits by using conventional formulas used in signal conditioning and conversion. • Implement their design in bread board and test it. • Generate appropriate design procedure to obtain a required measurement data for temperature, force, humidity, displacement and sound. • Log the data in computer using LABVIEW/ MATLAB/PSILAB. • Present data in a clear and meaningful manner. • Use transducers to create simple Mechatronics applications using data logging software.

42	Third/ V	ME8481	Dynamics Laboratory	• Ability to demonstrate the principles of kinematics and dynamics of machinery • Ability to use the measuring devices for dynamic testing.
43	Third/ V	HS8581	Professional Communication	• Make effective presentations • Participate confidently in Group Discussions. • Attend job interviews and be successful in them. • Develop adequate Soft Skills required for the workplace
44	Third/ VI	ME8591	Applied Hydraulics and Pneumatics	• Understanding operating principles and constructional features of hydraulic and pneumatic systems. • Knowledge with selection of hydraulic / pneumatic components • understanding of designing and layout of Hydraulic Power package and trouble shooting.
45	Third/ VI	MT8601	Design of Mechatronics System	• Understand the basics and key elements of Mechatronics design process • Familiar with basic system modelling • Understand the concepts of engineering system and dynamic response of the system

				• Realize the concepts of real time interfacing and data acquisition • Understanding the concepts of design of Mechatronics system through case studies
46	Third/ VI	ME8593	Design of Machine Elements	• Explain the influence of steady and variable stresses in machine component design. • Apply the concepts of design to shafts, keys and couplings. • Apply the concepts of design to temporary and permanent joints. • Apply the concepts of design to energy absorbing members, bearings and connecting rod. • Apply the concepts of design to bearings.
47	Third/ VI	MT8602	Industrial Automation	• Choose appropriate PLC and explain the architecture, installation procedures and trouble shooting. • Develop PLC programs using various functions of PLCs for a given application. • Explain the application development procedures in SCADA and manage data, alarm and storage. • Distinguish DCS, SCADA and PLC and explain the architecture of DCS • Describe the controller elements and program methods.

48	Third/ VI	MG8591	Principles of Management	• Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management
49	Third/ VI	GE8075	Intellectual Property Rights	• Ability to manage Intellectual Property portfolio to enhance the value of the firm.
50	Third/ VI	MT8611	Applied Hydraulics and Pneumatics Laboratory	• Select the actuators and valves for the design of fluid power circuits. • Design and simulate the fluid power circuits using software tool. • Test the simulated output by constructing the fluid power circuits using suitable actuators and valves.
51	Third/ VI	MT8612	Industrial Automation Laboratory	• Carryout wiring connections and troubleshoot in different PLCs. • Develop simple applications using LD, ST and FBD mode of programming. • Use timers and counter functions of PLC to construct simple applications. • Integrate and control process station with PLC.

				• Develop SCADA application using open source software. • Perform speed control on AC motor using VFD and PLC.
52	Third/ VI	ME8682	Design and Fabrication Project	• design and Fabricate the machine element or the mechanical product. • demonstrate the working model of the machine element or the mechanical product.

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PRINCIPAL

R-2013 MECHATRONICS PROGRAME OUTCOMES

S.No	Year/Sem	Sub Code	Subject Title	Course Outcome
1	FOUR / VII	MT6701	Medical Mechatronics	• The students will be ale to design , use and maintain various medical equipments
2	FOUR / VII	MT6702	Modeling and Simulation	• The students will be able to design and develop products using simulation techniques.
3	FOUR / VII	MT6703	Robotics and Machine Vision System	• Upon completion of this course, the students can able to apply the basic engineering knowledge for the design of robotics
4	FOUR / VII	ME6602	Automobile Engineering	• Upon completion of this course, the students will be able to identify the different components in automobile engineering. • Have clear understanding on different auxiliary and transmission systems usual.
5	FOUR / VII	ELECTIVE(II) MT6002	Diagnostic Techniques	• The students will be able to analyze the defects and rectify the faults. Also they will be able to monitor and maintain the equipment
6		MG6072	Marketing Management	• The learning skills of Marketing will enhance the knowledge about Marketer's Practices and create insights on Advertising, Branding, Retailing and

				Marketing Research.
7		MT6003	Engineering Economics and Cost Analysis	• The students will be able to carryout cost analysis for capital subjecting based on depreciation, money available , supply of material and demand of products.in their management profession.
8		ELECTIVE(III) MT6004	Industrial Electronics and Applications	• The students will be able to design various electronic industrial controllers
9		ME6501	Computer Aided Design	• Upon completion of this course, the students can able to use computer and CAD software's for modeling of mechanical components
10		IT6005	Digital Image Processing	• Discuss digital image fundamentals. • Apply image enhancement and restoration techniques. • Use image compression and segmentation Techniques. • Represent features of images.
11		EE6007	Micro Electro Mechanical Systems	• Ability to understand the operation of micro devices, micro systems and their applications. • Ability to design the micro devices, micro

				systems using the MEMS fabrication process.
12	FOUR / VII	MT6711	Computer Aided Design and Computer Aided Manufacturing Laboratory	• The students can able to apply the students can able to apply mathematical knowledge in modeling and assembly of parts
13	FOUR / VII	MT6712	Robotics Laboratory	• Use of Adam's software and MAT Lab software to model the different types of robots and calculate work volume for different robots.
14	FOUR / VII	MT6713	Design and Fabrication Project	• Use of design principles and develop conceptual and engineering design of any components. • Ability to fabricate any components using different manufacturing tools
15	FOUR / VIII	MT6801	Automotive Electronics	• The students will be able to use advanced sensors and actuators in the upgradation of automobiles.
16	FOUR / VIII	ELECTIVE(IV) MF6009	Rapid Prototyping	• To provide knowledge on different types of Rapid Prototyping systems and its applications in various fields
17	FOUR / VIII	MT6005	Virtual Instrumentation	• The students will be able to use virtual instruments to design various mechatronics systems
18	FOUR /	ME6015	Operations Research	• Upon completion of this course, the students can able to use the optimization techniques for use

	VIII			engineering and Business problems
19	FOUR / VIII	MG6071	Entrepreneurship Development	• Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.
20	FOUR / VIII	ELECTIVE(V) GE6075	Professional Ethics in Engineering	• Upon completion of the course, the student should be able to apply ethics in society, discuss the ethical issues related to engineering and realize the responsibilities and rights in the society
21	FOUR / VIII	MG6088	Software Project Management	• At the end of the course the students will be able to practice Project Management principles while developing a software.
22	FOUR / VIII	CS6302	Database Management Systems	• Design Databases for applications. • Use the Relational model, ER diagrams. • Apply concurrency control and recovery mechanisms for practical problems. • Design the Query Processor and Transaction Processor. • Apply security concepts to databases.
23	FOUR / VIII	CS6551	Computer Networks	• Identify the components required to build different types of networks

				• Choose the required functionality at each layer for given application • Identify solution for each functionality at each layer • Trace the flow of information from one node to another node in the network