

**K.L.N. College of Engineering**  
**Department of Mechanical Engineering**  
**Course Outcomes**

For Anna University Curriculum Regulation 2013

**Course Name: C101 (HS6151/ TECHNICAL ENGLISH – I)**

CO	COURSE OUTCOMES
<b>C101.1</b>	Apply the collaborative and social aspects of research and writing processes
<b>C101.2</b>	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
<b>C101.3</b>	Use appropriate technologies to organize, present, and communicate information to address a range of audiences, purposes, and genres.
<b>C101.4</b>	Explain the relationships among language, knowledge, and power including social, cultural, historical, and economic issues related to information, writing, and technology.
<b>C101.5</b>	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
<b>C102.1</b>	Find the Eigen values and Eigen vectors to diagonalise and reduce a matrix to quadratic form
<b>C102.2</b>	Check the convergences, divergences of infinite series
<b>C102.3</b>	Obtain the evolutes and envelopes of a given curve by using radius of curvature and center of curvature
<b>C102.4</b>	Calculate the maxima and minima value for functions of two variables
<b>C102.5</b>	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
<b>C103.1</b>	Classify the Bravais lattices and different types of crystal structures and growth techniques
<b>C103.2</b>	Demonstrate the properties of elasticity and heat transfer through objects
<b>C103.3</b>	Explain black body radiation, properties of matter waves and Schrodinger wave equations

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

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

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

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

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

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

**Course Name: C110 (HS6251/Technical English – II)**

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

**Course Name: C111 (MA6251/Mathematics – II)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C111.1</b>	Find solenoidal, irrotational vectors and explain the concept of Green's , Gauss divergence, Stoke's theorem to evaluate , single double and triple integrals.
<b>C111.2</b>	Obtain the P.I of Cauchy and Legendre Equation, explain the method of Variation of Parameters and solve simultaneous linear equations.
<b>C111.3</b>	Evaluate Laplace Transforms of periodic functions and solve ODE using Inverse Laplace Transform.
<b>C111.4</b>	Recall the properties of analytic functions for verifying C-R equations and determine Bilinear Transformation
<b>C111.5</b>	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	Explain 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 important
C113.5	Relate the significance of solid, liquid and gaseous 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 converters and digital to analog converters.

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

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

<b>C204.1</b>	Calculate fluid properties and characteristics of flow using mathematical knowledge.
<b>C204.2</b>	Compute losses in circular conduits using conservation laws.
<b>C204.3</b>	Perform dimensional analysis of a given set of variables using Buckingham's $\pi$ theorem and relate the model and prototype.
<b>C204.4</b>	Analyze the performance of pumps.
<b>C204.5</b>	Analyze the performance of hydraulic machines.
<b>CourseName:C205 (ME6302 Manufacturing Technology – I)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C205.1</b>	Explain the process of making patterns, preparation of sand mould, various special casting processes and casting defects.
<b>C205.2</b>	Describe various fusion, friction and special welding processes, soldering and brazing processes.
<b>C205.3</b>	Employ the appropriate metal forming techniques to produce components like hexagonal bolt, nut etc.,
<b>C205.4</b>	Illustrate the various sheet metal forming processes for a specific application.
<b>C205.5</b>	Describe the properties and bonding techniques of plastics and various plastic molding techniques.
<b>Course Name: C206 (EE6351 Electrical Drives and Controls)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C206.1</b>	Select the rating and classes of duty of machines for particular application electrical drive and draw the heating and cooling curves.
<b>C206.2</b>	Explain the mechanical and braking characteristics of dc and ac machines for particular application of electrical drive.
<b>C206.3</b>	Describe the starting methods of both dc and ac machines.
<b>C206.4</b>	Clarify conventional and solid state speed control of dc drives.
<b>C206.5</b>	Enlighten the speed control of dc and ac drive by conventional and solid state methods.
<b>Course Name: C207 (ME6311 Manufacturing Technology Laboratory – I)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C207.1</b>	Perform the taper turning operation for a given specification.
<b>C207.2</b>	Perform thread cutting operation as per the diagrams and compare with standard thread gauges.



<b>C207.3</b>	Calculate the eccentricity value for the required stroke length and practice eccentricity turning operation in a lathe.
<b>C207.4</b>	Produce square head using shaper machine as per given drawing and estimate the machining time.
<b>C207.5</b>	Calculate the material removal rate and perform Hexagonal head shaping on a given cylindrical work piece as per given drawing.
<b>Course Name: C208(CE6461Fluid Mechanics and Machinery Laboratory)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C208.1</b>	Calculate the coefficient of discharge for Orifice meter and Venturimeter.
<b>C208.2</b>	Calibrate the Rotameter and Estimate the friction factor for flow through pipes.
<b>C208.3</b>	Predict performance characteristics of centrifugal pump and submergible pump.
<b>C208.4</b>	Predict performance characteristics of reciprocating pump and gear pump.
<b>C208.5</b>	Predict performance characteristics of turbines.
<b>CourseName:C209(EE6365Electrical Engineering Laboratory)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C209.1</b>	Perform the load test, OCC, load characteristics and speed control ofDC shunt and DC series motor
<b>C209.2</b>	Perform the load test, OC and SC test on a single phase transformer
<b>C209.3</b>	Examine the regulation of an alternator by EMF and MMF methods
<b>C209.4</b>	Conduct the load test, speed control on various phase of induction motor
<b>C209.5</b>	Explore the DC and AC starters
<b>Course Name: C210(MA6452Statistics and Numerical Methods)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C210.1</b>	Identify small, large samples and apply testing of hypothesis.
<b>C210.2</b>	Apply ANOVA test to design of experiments.
<b>C210.3</b>	Determine the solution of algebraic and transcendental system of linear equations.
<b>C210.4</b>	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
<b>Course Name: C211(ME6401Kinematics of Machinery)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
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.
<b>Course Name: C212(ME6402Manufacturing Technology– II)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
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.
<b>Course Name: C213(ME6403Engineering Materials and Metallurgy)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
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 sketch isothermal 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.
<b>Course Name: C214(GE6351Environmental Science and Engineering)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>

<b>C214.1</b>	Describe the structure and functions of different eco system.
<b>C214.2</b>	Identify the various causes, effects and control measures of different types of pollution.
<b>C214.3</b>	Summarize the over exploitation and their effects of natural resources.
<b>C214.4</b>	Appraise the environmental issues and possible solution.
<b>C214.5</b>	Explain the causes of population growth and explosion.

**Course Name: C215(ME6404Thermal Engineering)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C215.1</b>	Calculate the mean effective pressure and air standard efficiency of different gas power cycles.
<b>C215.2</b>	Calculate the performance test on IC engines.
<b>C215.3</b>	Sketch the velocity diagrams of single and multi-stage turbines.
<b>C215.4</b>	Explain the classification and working principle of various types of air compressors.
<b>C215.5</b>	Calculate properties of moist air and COP of vapor refrigeration systems by using refrigeration table and chart.

**Course Name: C216(ME6411Manufacturing Technology Laboratory–II)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C216.1</b>	Demonstrate contour milling and generate a spur gear from a cylindrical work piece.
<b>C216.2</b>	Perform helical gear cutting operation and generate gear using hobbing machine.
<b>C216.3</b>	Generate gear using gear shaping machine and demonstrate plain surface grinding operation.
<b>C216.4</b>	Perform cylindrical grinding operation and practice Tool angle grinding with tool and Cutter Grinder.
<b>C216.5</b>	Measure cutting forces in Milling / Turning Process and develop CNC part programming.

**Course Name: C217(ME6412Thermal Engineering Laboratory – I)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C217.1</b>	Sketch the valve timing diagram and port timing diagram for single cylinder four stroke diesel engine and two stroke petrol engine.
<b>C217.2</b>	Calculate the mechanical efficiency of four stroke SI engine by Morse test.

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

<b>C302.5</b>	Analyze diffusion and convective mass transfer occurring in different applications.
<b>Course Name: C303 (ME6503 Design of Machine Elements)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C303.1</b>	Apply the principle of solid mechanics to design machine member under variable loading.
<b>C303.2</b>	Calculate the diameter of shafts based on strength, rigidity and design various types of coupling based on application.
<b>C303.3</b>	Calculate design parameters of permanent and temporary joint on various loading application.
<b>C303.4</b>	Calculate the design parameter for energy storage element and engine components.
<b>C303.5</b>	Calculate the design parameters of various types of bearings.
<b>Course Name: C304 ( ME6504 Metrology and Measurements)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C304.1</b>	Discuss the measurement systems, units and dimensions, calibration and correction.
<b>C304.2</b>	Explain the various linear and angular measurement systems and understand the concept of interchangeability
<b>C304.3</b>	Describe the working principle of auto collimator, CMM and list the applications of them.
<b>C304.4</b>	Explain the various form measurements like thread, gear, straightness, flatness, roundness and surface finish.
<b>C304.5</b>	Discuss the working of miscellaneous measuring equipment for measuring temperature, velocity, pressure.
<b>CourseName:C305 (ME6505 Dynamics of Machines)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C305.1</b>	Explain the force-motion relationship in components subjected to external forces and analysis of standard mechanisms.
<b>C305.2</b>	Explain the undesirable effects of unbalances resulting from prescribed motions in mechanism.
<b>C305.3</b>	Calculate the natural frequencies for undamped and damped vibrating systems.
<b>C305.4</b>	Solve problem on effect of Dynamics of undesirable vibrations.
<b>C305.5</b>	Explain the principles in mechanisms used for speed control and stability control.
<b>Course Name: C306(GE6075 Professional Ethics in Engineering)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>

<b>C306.1</b>	Distinguish between Moral and Ethics.
<b>C306.2</b>	Summarize the moral theories and ethical inquiries.
<b>C306.3</b>	Evaluate the result of the engineering projects by applying ethical theories.
<b>C306.4</b>	Discuss about professional rights, employ rights and intellectual property rights, safety and risk involved in engineering projects.
<b>C306.5</b>	Judge the role of engineer in environmental issues, computer applications, weapons development, multinational corporations and Corporate Social Responsibility.

**Course Name: C307 (ME6511 Dynamics Laboratory)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C307.1</b>	Review the various types of gears, gear trains, kinematic mechanisms, and universal joints.
<b>C307.2</b>	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
<b>C307.3</b>	Inspect the critical speed of shaft under the given load conditions and the gyroscopic effect and couple on motorized gyroscope.
<b>C307.4</b>	Sketch the characteristic curves of Watt, Porter, Proell and Hartnell governors and motion curves for the given cam follower setup.
<b>C307.5</b>	Examine the balancing of rotating masses in dynamic balancing machine.

**Course Name: C308(ME6512 Thermal Engineering Laboratory-II)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C308.1</b>	Conduct a test to find thermal conductivity of various engineering materials.
<b>C308.2</b>	Measure heat transfer rate in free and forced convection environment.
<b>C308.3</b>	Measure emissivity of grey surface.
<b>C308.4</b>	Measure the effectiveness of parallel and counter flow heat exchanger.
<b>C308.5</b>	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)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C309.1</b>	Check the dimensions and the dimensional deviations of given parts.

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

<b>C312.4</b>	Demonstrate how the steering, brakes and the suspension system operate.
<b>C312.5</b>	Justify the importance of alternative fuels.
<b>Course Name: C313 (ME6603 Finite Element Analysis)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C313.1</b>	Explain the steps involved in FEA and also the types of weight residual methods.
<b>C313.2</b>	Formulate FE equation for structural, heat transfer and vibration problems.
<b>C313.3</b>	Predict finite element equations for two dimensional thermal and torsion problems.
<b>C313.4</b>	Predict finite element equations for axisymmetric bodies, plate and shell.
<b>C313.5</b>	Apply matrix solution techniques to dynamic problems.
<b>Course Name: C314 (ME6604 Gas Dynamics Jet and Propulsion)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C314.1</b>	Discuss the basic difference between incompressible flow and compressible flow and the effect of Mach number on compressible flow.
<b>C314.2</b>	Compare Fanno flow and Rayleigh flow and calculate the flow properties in Fanno flow and Rayleigh flow.
<b>C314.3</b>	Compute the Prandtl Meyer equation for shock waves.
<b>C314.4</b>	Compare the working of various jet engines and calculate thrust & efficiency in jet propulsion using gas dynamics principles.
<b>C314.5</b>	Classify rocket engines and calculate efficiency in rocket propulsion.
<b>Course Name: C315 E1 (MG 6072 Marketing Management) (Elective I)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C315.1</b>	Define the marketing process, market dynamics, demands, and environment.
<b>C315.2</b>	Differentiate demographic, Psychographic and geographic segmentation.
<b>C315.3</b>	Understand the pricing methods and pricing management.
<b>C315.4</b>	Formulate marketing strategy and marketing process.
<b>C315.5</b>	Discuss the modern trends in retailing, sales promotions, e-marketing.



<b>Course Name: C315 E2 (ME 6001 Quality Control and Reliability Engineering) (Elective – I)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
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.
<b>Course Name: C315 E3 (ME 6002 Refrigeration and Air Conditioning) (Elective – I)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C315.1</b>	Explain the principle of refrigeration, cycles, properties and its environment effects.
<b>C 315.2</b>	Explain vapor compression systems and different processes, equipment.
<b>C 315.3</b>	Describe the working principle of various types of refrigeration systems.
<b>C 315.4</b>	Discuss psychrometric properties and processes, and air conditioning process.
<b>C 315.5</b>	Estimate cooling load factor, winter and summer air conditioning load and human comfort condition.
<b>Course Name: C315 E4 (ME 6003 Renewable Sources of Energy) (Elective – I)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C315.1</b>	State the economics of renewable energy systems.
<b>C 315.2</b>	Explain the functions of Solar Cells.
<b>C 315.3</b>	Discuss the details of Wind Turbine Generator.
<b>C 315.4</b>	List out the bio – energy applications.
<b>C 315.5</b>	Analyze Hybrid Systems of renewable energy.

<b>Course Name: C315 E5 (ME6004Unconventional Machining Processes) (Elective – I)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C315.1</b>	Justify the needs of unconventional machining processes.
<b>C315.2</b>	Explain the working principles of Mechanical Energy Based Processes and various process parameters influence on their performance.
<b>C315.3</b>	Differentiate between Electric discharge machining and Wire cut Electric discharge machining.
<b>C315.4</b>	Compare the chemical machining process with electro-chemical machining process.
<b>C315.5</b>	Explain the working principles of thermal energy based processes.
<b>Course Name: C316 (ME6611CAD / CAM Laboratory)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C316.1</b>	Create 2D and 3D models using modeling software.
<b>C316.2</b>	Understand the CNC control in modern manufacturing system.
<b>C316.3</b>	Prepare CNC part programming and perform manufacturing.
<b>C316.4</b>	Create the CL Data and Post process generation using CAM packages.
<b>C316.5</b>	Apply CAPP in Machining and Turning Centre.
<b>Course Name: C317 (ME6612Design and Fabrication Project)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C317.1</b>	Develop conceptual and engineering design of any mechanical components and also to fabricate them using different manufacturing tools.
<b>Course Name: C318 (GE6563Communication Skills - Laboratory)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C318.1</b>	Apply appropriate communication skills across settings, purposes, and audiences.
<b>C318.2</b>	Demonstrate knowledge of communication theory and application.
<b>C318.3</b>	Practice critical thinking to develop innovative and well-founded perspectives related to the students' emphases.
<b>C318.4</b>	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.
<b>Course Name: C401 ( ME6701Power Plant Engineering)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
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.
<b>Course Name: C402 ( ME6702Mechatronics)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
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.
<b>Course Name: C403 (ME6703Computer Integrated Manufacturing Systems)</b>	
<b>CO</b>	<b>COURSE OUTCOMES</b>
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.
<b>Course Name: C404 ( GE6757Total Quality Management)</b>	

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

<b>C405.1</b>	Explain lamina constitutive equation and various techniques involved in manufacturing composite.
<b>C405.2</b>	Solve the laminate continuity equation for various ply laminates and determine lamina stress within composite.
<b>C405.3</b>	Predict the failure of laminate based on various failure theories.
<b>C405.4</b>	Predict the coefficient of thermal expansion for orthotropic lamina and special laminate.
<b>C405.5</b>	Examine laminate plate based on various testing such as buckling test, bending test and vibration measurement.

**Course Name: C405 E4 (ME 6008 Welding Technology)  
(Elective – II)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C405.1</b>	Compare various types of Gas and Arc welding processes.
<b>C405.2</b>	Explain the working principles of resistance welding process and various process parameters influence on their performance.
<b>C405.3</b>	Illustrate the working of various types of solid state welding processes.
<b>C405.4</b>	Choose the suitable welding process for aerospace, nuclear and automobile industries.
<b>C405.5</b>	Compare different types of Welding process for effective Welding of Aluminum, Copper, and Stainless steels.

**Course Name: C405 E5 (ME 6009 Energy Conservation and Management)  
(Elective – II)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C405.1</b>	Understand and analyze the energy data of industries.
<b>C405.2</b>	Suggest methodologies for energy savings.
<b>C405.3</b>	Conduct energy accounting and balancing
<b>C405.4</b>	Conduct energy audit and suggest methodologies for energy savings
<b>C405.5</b>	Utilize the available resources in optimal ways

**Course Name: C406 E1 (ME 6010 Robotics)  
(Elective – III)**

<b>CO</b>	<b>COURSE OUTCOMES</b>
<b>C406.1</b>	Summarize the basic concepts of industrial robotics and key components of robotics technologies.

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

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

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



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

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

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