Course Outcomes (CO)

(R 2017)

Branch: B.E, Mechanical & Automation Engineering

Course Code: C101 Course Name: HS8151 Communicative English

C101.1	Read articles of a general kind in magazines and newspapers.
C101.2	Participate effectively in informal conversations; introduce themselves and their friends and express opinions in English.
C101.3	Comprehend conversations and short talks delivered in English.
C101.4	Write short essays of a general kind.
C101.5	Write personal letters and emails in English.

Course Code: C102 Course Name: MA8151 Engineering Mathematics-I

C102.1	Use both the limit definition and rules of differentiation to differentiate functions
C102.2	Apply differentiation to solve maxima and minima problems.
C102.3	Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus. 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.
C102.4	Apply integration to compute multiple integrals, area, volume, integrals in polar coordinates, in addition to change of order and change of variables.
C102.5	Apply various techniques in solving differential equations.

Course Code: C103 Course Name: PH8151 Engineering Physics

C103.1	The students will gain knowledge on the basics of properties of matter and its applications
C103.2	The students will acquire knowledge on the concepts of waves and optical devices and their applications in fibre optics
C103.3	The students will have adequate knowledge on the concepts of thermal properties of the materials and their applications in expansion joints and heat exchangers.
C103.4	The students will get knowledge on advanced physics concepts of quantum theory and its applications in tunnelling microscopes,
C103.5	The students will understand the basics of crystals their structures and different crystal growth techniques.

Course Code: C104 Course Name: CY8151 Engineering Chemistry

C104.1	To make the students conversant with boiler feed water requirements, related problems and water treatment techniques.
C104.2	To develop an understanding of the basic concepts of phase rule and its applications to single and two component systems and appreciate the purpose and significance of alloys.
C104.3	Preparation, properties and applications of engineering materials.
C104.4	Types of fuels, calorific value calculations, manufacture of solid, liquid and gaseous fuels.
C104.5	Principles and generation of energy in batteries, nuclear reactors, solar cells, wind mills and fuel cells.

Course Code: C105 Course Name: GE8151 Problem Solving and Python Programming

C105.1	Develop algorithmic solutions to simple computational problems
C105.2	Read, write, execute by hand simple Python programs.
C105.3	Structure simple Python programs for solving problems.
C105.4	Decompose a Python program into functions.
C105.5	Represent compound data using Python lists, tuples, dictionaries. Read and write data from/to files in Python Programs.

Course Code: C106 Course Name: GE8152 Engineering Graphics

C106.1	Ability to familiarize with the fundamentals and standards of Engineering graphics
C106.2	Ability to perform freehand sketching of basic geometrical constructions and multiple views of objects
C106.3	Ability to Project orthographic projections of lines and plane surfaces
C106.4	Ability to draw projections of solids and development of surfaces
C106.5	Ability to visualize and to project isometric and perspective sections of simple solids

Course Code: C107 Course Name: GE8161 Problem Solving and Python Programming Lab

C107.1	Write, test, and debug simple Python programs.
C107.2	Implement Python programs with conditionals and loops.
C107.3	Develop Python programs step-wise by defining functions and calling them.
C107.4	Use Python lists, tuples, dictionaries for representing compound data.
C107.5	Read and write data from/to files in Python.

Course Code: C108 Course Name: BS8161 Physics & Chemistry Lab

C108.1	To provide the basic practical exposure to all the engineering and technological streams in the field of physics with properties of matter and liquids.
C108.2	To provide the basic practical exposure to all the engineering and technological streams in the field of optics.
C108.3	The students are able to know about the thermal physics .
C108.4	To gain the knowledge about crystalline materials.

C108.5	To develop the knowledge of fiber optics cables optics and its applications

Course Code: C109 Course Name: HS8251 Technical English

C109.1	Read technical texts
C109.2	Write area- specific texts effortlessly.
C109.3	Listen lectures in their area of specialization.
C109.4	Comprehend talks in their area of specialisation
C109.5	Speak appropriately and effectively in varied formal and informal contexts.

Course Code: C110 Course Name: MA 8251 Engineering Mathematics-II

C110.1	Eigen values and eigenvectors, diagonalization of a matrix, Symmetric matrices, Positive definite matrices and similar matrices.
C110.2	Gradient, divergence and curl of a vector point function and related identities.
C110.3	Evaluation of line, surface and volume integrals using Gauss, Stokes and Green's theorems and their verification.
C110.4	Analytic functions, conformal mapping and complex integration.
C110.5	Laplace transform and inverse transform of simple functions, properties, various related theorems and application to differential equations with constant coefficients.

Course Code: C111 Course Name: PH8251 Material Science

C111.1	The students will have knowledge on the various phase diagrams and their applications
C111.2	The students will acquire knowledge on Fe-Fe2C phase diagram various microstructures and alloys
C111.3	The students will get knowledge on mechanical properties of materials and their measurements
C111.4	The students will gain knowledge on magnetic dielectric, and superconducting materials and properties of materials
C111.5	The students will understand the basics of ceramics , composites and nano materials

ourse Code: C112 Course Name: BE8253 Basic Electrical, Electronics and Instrumentation Engineering

C112.1	To Understand electric circuits
C112.2	To gain knowledge in Electric circuit laws, single and three phase circuits and wiring
C112.3	To study the working principles of electrical machines
C112.4	Understand the concepts of various electronic devices and circuits
C112.5	To Choose appropriate instruments for electrical measurement for a specific application

rse Code: C113 Course Name: GE8291 Environment science and engineering

C113.1	Public awareness of environment at infant stage.
C113.2	Pollution controlling aids
C113.3	Development and improvement in standard of living has lead to serious environmental disasters.
C113.4	Ignorance and incomplete knowledge has lead to misconceptions. Knowledge about water conservation methods.
C113.5	World's Population related problems and AIDS

Course Code: C114 Course Name: GE8292 Engineering Mechanics

C114.1	Ability to illustrate the vectorial and scalar representation of forces and moments
C114.2	Ability to analyse the rigid body in equilibrium
C114.3	Ability to evaluate the properties of surfaces and solids
C114.4	Ability to calculate dynamic forces exerted in rigid body
C114.5	Ability to determine the friction and the effects by the laws of friction

Course Code: C115 Course Name: GE8261 Engineering Practices Laboratory

C115.1	Ability to Fabricate carpentry components and pipe connections including plumbing works
C115.2	Ability to Use welding equipments to join the structures
C115.3	Ability to Carry out the basic machining operations
C115.4	Ability to Make the models using sheet metal works
C115.5	Ability to Illustrate on centrifugal pump, Air conditioner, operations of smithy, foundry and fittings

ode: C201 Course Name: MA8353 Transforms and Partial Differential Equations

C201.1	Understand how to solve the given standard partial differential equations.
C201.2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
C201.3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
C201.4	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.
C201.5	Use the effective mathematical tools for the solutions of partial differential equations by using Z transform techniques for discrete time systems.

Course Code: C202 Course Name: ME8391 Engineering Thermodynamics

C202.1	Apply the first law of thermodynamics for simple open and closed systems under steady and unsteady conditions
C202.2	Apply second law of thermodynamics to open and closed systems and calculate entropy and availability
C202.3	Apply Rankine cycle to steam power plant and compare few cycle improvement methods
C202.4	Derive simple thermodynamic relations of ideal and real gases
C202.5	Calculate the properties of gas mixtures and moist air and its use in psychometric Processes

Course Code: C203 Course Name: CE8394 Fluid Mechanics and Machinery

C203.1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.
C203.2	Can analyse and calculate major and minor losses associated with pipe flow in piping networks
C203.3	Can mathematically predict the nature of physical quantities
C203.4	Can critically analyse the performance of pumps
C203.5	Can critically analyse the performance of turbines

Course Code: C204 Course Name: ME8351 Manufacturing Technology –I

C204.1	Explain different metal casting processes, associated defects, merits and demerits
C204.2	Compare different metal joining processes
C204.3	Summarize various hot working and cold working methods of metals
C204.4	Explain various sheet metal making processes
C204.5	Distinguish various methods of manufacturing plastic components

Code: C205 Course Name: EE8353 ELECTRICAL DRIVES AND CONTROLS

C205.1	To understand the basic concepts of different types of electrical machines and their performance.
C205.2	To study the drive motor characterisitics
C205.3	To study the different methods of starting D.C motors and induction motors.
C205.4	To study the conventional and solid-state D.C. drives
C205.5	To study the conventional and solid-state A.C. drives

06 Course Name: EC8382 ELECTRONICS AND MICROPROCESSORS LABORATORY

C206.1	Ability to perform speed characteristics of Zener diode and PN Junction diode
C206.2	Ability to perform characteristics of Half Adder and Full Adder
C206.3	Ability to perform Shift Registers and Counters
C206.4	Ability to perform Operational Amplifier (Adder, Subtractor, Differentiator, Integrator, Inverting and Non – Inverting
C206.5	Ability to understand various microprocessor and Stepper Motor Interfacing.

: C208 Course Name: HS8381INTERPERSONAL SKILLS/LISTENING&SPEAKING

C208.1	Use different machine tools to manufacturing gears
C208.2	Ability to use different machine tools to manufacturing gears
C208.3	Ability to use different machine tools for finishing operations
C208.4	Ability to manufacture tools using cutter grinder
C208.5	Develop CNC part programming

Course Code: C209 Course Name: MG8491 Operation Research

C209.1	Identify various linear models
C209.2	Apply transportation and network model in solving engineering problems.
C209.3	To understand the inventory model in manufacturing industry.
C209.4	To analyse various queueing model in engineering.
C209.5	To apply various decision model for use in business function and management decision.

ırse Code:C210 Course Name: AN8401 Manufacturing System Management

C210.1	To gain Knowledge gained in replacement policies of man power and equipments.
C210.2	To gain Knowledge in product cost and costing analysis.
C211.3	Ability to design, develop and implement are integrated system involving man, machine, materials and energy
C212.4	Ability to apply work standards method in manufacturing.
C213.5	Ability to identify different types of maintenance strategies.

ode: C211 Course Name: CE8395 Strength of Materials For Mechanical Engineers

C211.1	Understand the concepts of stress and strain in simple and compound bars, the importance of principal stresses and principal planes
C211.2	Understand the load transferring mechanism in beams and stress distribution due to shearing force and bending moment
C211.3	Apply basic equation of simple torsion in designing of shafts and helical spring
C211.4	Calculate the slope and deflection in beams using different methods.
C211.5	Analyze and design thin and thick shells for the applied internal and external pressures

Course Code: C212 Course Name PR8451 Mechanics of Machines

C212.1	Be able to design linkage, cam mechanim for a given input/output motion.
C212.2	To classify different type of gears and gear trains
C212.3	To Study of effects of friction in different machine members
C212.4	To Explain the undesirable effects of unbalances & he principles in mechanisms used for speed control
C212.5	To Solve problem on effect of Dynamics of undesirable vibrations.

Course Code: C213 Course Name: ME8491 Engineering Metallurgy

C213.1	Explain alloys and phase diagram, Iron-Iron carbon diagram and steel classification

C213.2	Explain isothermal transformation, continuous cooling diagrams and different heat treatment processes
C213.3	Clarify the effect of alloying elements on ferrous and non-ferrous metals
C213.4	Summarize the properties and applications of non-metallic materials.
C213.5	Explain the testing of mechanical properties

Course Code: C214 Course Name: ME8451 Manufacturing Technology– II

C214.1	Ability to explain the mechanism of material removal processes
C214.2	Ability to describe the constructional and operational features of centre lathe and other special purpose lathes
C214.3	Describe the constructional and operational features of shaper, planner, milling, drilling, sawing and broaching machines
C214.4	Explain the types of grinding and other super finishing processes apart from gear manufacturing processes
C214.5	Ability to summarize numerical control of machine tools and write a part program

e: CE8381 STRENGTH OF MATERIALS AND FLUID MECHANICS & MACHINERY LABORATORY

C214.1	Tension test on a mild steel rod & Double shear test on Mild steel and Aluminium rods
C214.2	Torsion test on mild steel rod 4. Impact test on metal specimen
C214.3	Hardness test on metals - Brinnell and Rockwell Hardness Number 6. Deflection test on beams
C214.4	Ability to study Tempering- Improvement Mechanical properties Comparison
C214.5	Ability to do Microscopic Examination of (i) Hardened samples and (ii) ttempered samples.

Course Code: C216 Course Name: ME8461 Manufacturing Technology Lab

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 Code: C218 Course Name: HS8461 Advanced Reading and Writing

C218.1	Ability to read and evaluate texts critically
C218.2	Ability to write different types of essays
C218.3	Ability to write reports and winning job applications
C218.4	Ability to organize ideas, projects and to write e-mails.
C218.5	Ability to display critical thinking in various professional contexts.

e Code:C214 Course Name: CS8492 DATABASE MANAGEMENT SYSTEMS

C214.1	Classify the modern and futuristic database applications based on size and complexity
C214.2	Map ER model to Relational model to perform database design effectively
C214.3	Write queries using normalization criteria and optimize queries
C214.4	Compare and contrast various indexing strategies in different database systems
C214.5	Appraise how advanced databases differ from traditional databases.

Course Code: C302 Course Name: ME8593 Design of Machine Elements

C302.1	Explain the influence of steady and variable stresses in machine component design.
C302.2	Apply the concepts of design to shafts, keys and couplings
C302.3	Apply the concepts of design to temporary and permanent joints
C302.4	Apply the concepts of design to energy absorbing members, connecting rod and crank shaft.
C302.5	Apply the concepts of design to bearings

ırse Code:C303 Course Name: ME8591 Applied Hydraulics and Pneumatics

C303.1	To Study FLUID POWER PRINCIPLES AND HYDRAULIC PUMPS
C303.2	ToUnderstand operating principles and constructional features of hydraulic systems.
C303.3	To Understand operating principles and constructional features of pneumatic systems.
C303.4	To gain Knowledge with selection of hydraulic / pneumatic components
C303.5	To understand& designing and layout of Hydraulic Power package and trouble shooting.

Course Code: C301 Course Name: AN8501 LAN AND NETWORKING

C301.1	Ability to Look up Internet Addresses.
C301.2	To Write a program to trace the port of a particular host.
C301.3	To Write a program to implement the daytime protocol.
C301.4	To Demonstration of TCP/IP protocol. And UDP Protocol.
C301.5	To Implement a chat server using TCP/IP protocol & Transfer of files from PC to PC using Windows / Unix socket processing

ırse Code:C307 Course Name: AN8511 Dynamics and Metrology Laboratory

C307.1	Review the various types of gears, gear trains, kinematic mechanisms, and universal joints.
C307.2	Sketch the characteristic curves of Watt, Porter, Proell and Hartnell governors and motion curves for the given cam follower setup.
C307.3	Inspect the critical speed of shaft under the given load conditions and the gyroscopic effect and couple on motorized gyroscope.
C307.4	To make the students understand the fundamental principles of measuring techniques by practicing exercises on various measuring instruments.
C307.5	To understand how certain measuring devices are used for dynamic testing.

e Code:C316 Course Name: CS8481 Database Management Systems Laboratory

C316.1	**Ability to Design and implement a database schema for a given problem-domain**
C316.2	**Ability toPopulate and query a database**
C316.3	**Ability to Create and maintain tables using PL/SQL.**
C316.4	**Able to Have hands on experience on DDL Commands**
C316.5	**Ability to Prepare reports.**

ourse Code:C216 Course Name: AN8511 LAN and Networking Laboratory

C216.1	**Ability to Look up Internet Addresses.**
C216.2	**To Write a program to trace the port of a particular host.**
C216.3	**To Write a program to implement the daytime protocol.**
C216.4	**To Demonstration of TCP/IP protocol. And UDP Protocol.**
C216.5	**To Implement a chat server using TCP/IP protocol & Transfer of files from PC to PC using Windows / Unix socket processing**

Course Code:C311 Course Name: MG8591 Principles of Management

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 Code: C215 Course Name: AN8601 Thermal Engineering

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.**

ourse Code: C309 Course Name: ME8651 Design of Transmission systems

C309.1	**Design belt drives (flat belt, V-belt), chain drives, rope drives, belt drive pulleys & chain sprockets.**
C309.2	**Design spur and straight helical gears based on strength and wear consideration.**
C309.3	**Design straight bevel gear, worm gear pair and cross helical gear.**
C309.4	**Design various gear boxes (sliding mesh, constant mesh, multispeed) through geometric progression, standard step ratio, ray diagram, kinematics layout.**
C309.5	**Design various cams, clutches, internal and external shoe brakes using basic knowledge acquired from earlier studies.**

Course Code: C311 Course Name: ME8693 Heat and Mass Transfer

C311.1	**Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems**
C311.2	**Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems**
C311.3	**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**
C311.4	**Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems**
C311.5	**Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications**

Course Code: C312 Course Name: ME8692 Finite Element Analysis

C312.1	**Explain the steps involved in FEA and also the types of weight residual methods.**
C312.2	**Formulate FE equation for structural, heat transfer and vibration problems.**
C312.3	**Predict finite element equations for two dimensional thermal and torsion problems.**
C312.4	**Predict finite element equations for axisymmetric bodies, plate and shell.**
C312.5	**Apply matrix solution techniques to dynamic problems.**

Course Code:C313 Course Name: IE8591 Manufacturing Automation

C313.1	**Able to classify types of automation,strategies, business functions with mathematical models.**
C313.2	**Able to identify control technologies in conjuction with PLCs for automation.**
C313.3	**Able to design transfer lines using line balancing method**
C313.4	**Able to develop part program,APT program for CNC Machines and Robotics**
C313.5	**Able to select AGVs, storage systems,data capture technologies**

Course Code:C313 Course Name: AN8001 Metal Cutting and Tool Design

C313.1	**Knowledge in the mechanics of various cutting processes and selection of cutting parameters.**
C313.2	**Ability to meaure temperature distribution in metal cutting.**
C313.3	**Ability to identify machinability criteria and form of tool-wear in metal cutting**
C313.4	**Ability to design single / multipoint cutting tools.**
C313.5	**Confidence in designing and recommending jigs and fixtures**

Course Code:C315 Course Name: AN8681 Automation Laboratory

C315.1	**Ability to write CNC programming using G-code nd M-code**
C315.2	**Ability to write programming for robot control**

C315.3	Ability to use PLC for actutation
C315.4	Ability to draw Ladder Logic diagram for PLC
C315.5	Ability to simulate the actuation of automation devices using Software

Course Code: C316 Course Name: ME8682 Design and Fabrication Project

C316.1	Develop conceptual and engineering design of any mechanical components and also to fabricate them using different manufacturing tools.

Course Code: C317 Course Name: HS8581 Professional Communication

C317.1	Make effective presentations
C317.2	Participate confidently in Group Discussions
C317.3	Attend job interviews and be successful in them
C317.4	Develop adequate Soft Skills required for the workplace

Course Code: C403 Course Name: ME8791 Mechatronics

C403.1	State the specifications of sensors and choose the suitable sensors for real time applications.
C403.2	Combine the real time control systems with peripheral devices through programmable interface techniques.
C403.3	Test the input output terminals of PLC based control system by interfacing technique.
C403.4	Construct the ladder logic circuits for simple automation system.
C403.5	Design Mechatronics system with the help of microprocessor, PLC and other electrical and electronic Circuits.

Course Code:C403 Course Name:ME8094 Computer Integrated Manufacturing Systems

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.

rse Code:C403 Course Name:AN8701 MEASUREMENTS AND CONTROLS

C403.1	To explain different terminologies of Mechanical Measurements.
C403.2	To understand the principle and use of sensors for measurement of different parameters.
C403.3	To identify and choose appropriate parameters of measurement.
C403.4	To understand the concept of feedback control systems and their applications.
C403.5	To conversant with Usage of Automobile control of mechanisms in measurements of mechanical parameters.

Course Code: C402 Course Name: ME8793 Process Planning and Cost Estimation

C402.1	Explain the methods of process planning and the various steps involved in process selection.
C402.2	Examine the various steps involved in process planning activities.
C402.3	Explain the procedure of cost estimation.
C402.4	Estimate the production cost of a given component produced in foundry shop, forging shop & welding shop.
C402.5	Calculate the machining time for different operations performed in lathe, milling, shaping, planning, drilling, boring & grinding.

Course Code: C407 Course Name: MF8761 Computer Aided Simulation and Analysis Laboratory

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 Code: C408 Course Name: ME8781 Mechatronics Laboratory

C408.1	Ability to create the program for arithmetic functions and the program for sorting, code conversion functions.
C408.2	Ability to formulate the program codes to interface with traffic light controller and stepper motor.
C408.3	Ability to compare the set speed with actual speed of DC motor by interfacing suitable speed sensors.
C408.4	Ability to integrate all the hydraulic, pneumatic and electro pneumatic circuits by using simulation software.
C408.5	Ability to create the program for arithmetic functions and the program for sorting, code conversion functions.

Course Code: C408 Course Name: ME8099 Robotics

C408.1	Explain the concepts of industrial robots, classification, specifications and coordinate systems. Also summarize the need and application of robots in different sectors.
C408.2	Illustrate the different types of robot drive systems as well as robot end effectors.
C408.3	Apply the different sensors and image processing techniques in robotics to improve the ability of robots.
C408.4	Develop robotic programs for different tasks and familiarize with the kinematics of robot.
C408.5	Examine the implementation of robots in various industrial sectors and interpolate the economic analysis of robots.

Course Code: C412 Course Name: AN 8811 Project work

C412.1	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