GANDHI ACADEMY OF TECHNOLOGY AND ENGINEERING

(Approved by AICTE, New Delhi, Affiliated to BPUT, Odisha and Recognized by Dept. of SD & TE, Govt. of Odisha)

Contact : +91 9337753377 Ph. : 0680-2280828, Fax : 0680-2010006
P.O/P.S : Golanthara, Konisi, Berhampur- 761 008, Dist : Ganjam (ODISHA)

FIRST YEAR

C101- MATHEMATICS-I

CO_1	Apply the knowledge of calculus, Gamma & Beta functions to analyze engineering problems. (BL-3)
CO_2	Solve first-order differential equations analytically using standard methods. (BL-3)
CO_3	Demonstrate various physical models through higher-order differential equations and solve such equations. (BL-4)
CO_4	Apply knowledge of homogeneous equations with constant coefficients and Euler-Cauchy equations. (BL-3)
CO_5	Obtain series solutions of differential equations and explain applications of Bessel's functions. (BL-5)
CO_6	Apply Laplace transforms to determine complete solutions of ordinary differential equations. (BL-3)

C102-COMMUNICATIVE ENGLISH

CO_1	Define the role of communication in the present day world.
CO_2	Understand the fundamentals of Grammar for error free written communication.
CO_3	Use basic knowledge in Phonetics and Pronunciation skills for better Communication.
CO_4	Illustrate the diversified traditions and cultures through interpersonal communication.
CO_5	Evaluate student's competency through various writing skills.
CO_6	Develop the confidence to make communication in all the situations with knowledge on soft skills.

C103- PHYSICS

CO_1	Demonstrate understanding of oscillatory motion, resonance, and wave propagation through mathematical models and experiments. (BL-2)
CO_2	Apply principles of geometrical and wave optics to solve problems related to reflection, refraction, interference, and diffraction. (BL-3)
CO_3	Correlate principles of lasers and optical fibers and evaluate their applications in modern technology. (BL-5)
CO_4	Estimate the structure, bonding, and electrical properties of solid-state materials for technological advancements. (BL-4)
CO_5	Analyze the key concepts and principles of quantum mechanics. (BL-4)
CO_6	Illustrate the fundamental concepts of quantum mechanics to explain particle behavior at atomic and subatomic scales. (BL-2)

C104-BASIC ELECTRICAL ENGINEERING

CO_1	Recognize the circuit elements with their characteristics and solve Electrical engineering circuit problems applying:KCL, KVL, node voltage analysis, mesh current analysis, super position theorem and maximum power transfer theorem.
CO_2	Analyze the ac circuits having Resistive, Inductive and Capacitive load in the presence of sinusoidal excitation along with resonance condition.
CO_3	Evaluate the transient and steady state response of various electrical circuits.
CO_4	Understand the generation and distribution of ac power and simultaneously can apply to solve the problems relating to complex powers of single phase and three phase AC circuits.
CO_5	Differentiate the relationship between the Magnetic and Electric circuits.
CO_6	Explain and generalize the construction, principle of operation and the relating governing equations of electric machines like: DC Generator, DC Motor Induction Motors and Alternators.

C105-BASICS OF MECHANICAL ENGINEERING

CO_1	Understand basics of thermodynamics
CO_2	Application of basics of thermodynamics
CO_3	Illustrate basics of heat transfer, refrigeration and internal combustion engine
CO_4	Understand basics of Robotics
CO_5	Understand the basics of Mechanical measuring instruments
CO_6	Mechanism of power transfer through belt,rope,chain and gear drives

C114-ENGLISH LANGUAGE LAB

CO_1	Explain and facilitate computer-aided multi-media instruction enabling individualized and independent language learning.
CO_2	Interpret the students to the nuances of English speech sounds, word accent, intonation and rhythm.
CO_3	Change a consistent accent and intelligibility in their pronunciation of English by providing an opportunity for practice in speaking.
CO_4	Develop the fluency in spoken English and neutralize mother tongue influence.
CO_5	Compare the abilities of students with real life situations faced by the students.
CO_6	Modify students to use language appropriately for interviews, group discussion and public speaking.

C115- PHYSICS LAB

CO$_1$	Explain the value of g on various places.
CO$_2$	Summarize the elasticity of various materials.
CO$_3$	Analyses the characteristics of various diode.
CO$_4$	Interpret the law of string.
CO$_5$	Determine the wavelength of light.
CO$_6$	Illustrate the viscosity of liquid.

C116-BASIC ELECTRICAL ENGINEERING LAB

CO$_1$	Understand the basics of Electrical Laws which can be applied for solving electrical Circuits.
CO$_2$	Interpret and explain DC and AC circuits.
CO$_3$	Analyses Three phase circuits.
CO$_4$	Understand elementary idea of Magnetic Circuits.
CO$_5$	Classify various electrical Machines.
CO$_6$	Gain knowledge about the different Electrical Machines.

C117-BASICS OF MECH ENGINEERING LAB

CO$_1$	Study the fundamental of IC engine
CO$_2$	Demonstrate pressure measuring instruments of fluid.
CO$_3$	Study on analytical knowledge about refrigerator and air conditioner.
CO$_4$	Demonstrate fundamental knowledge of automobile transmission system.
CO$_5$	Understand about the construction and function of gear and gear train.
CO$_6$	Understand the working and construction of steam power plant.

C118-WORKSHOP

CO$_1$	Aquire a good knowledge and experience about the working conditions at shop floor level.
CO$_2$	Practice on fabrication of components through various operations in fitting and welding.
CO$_3$	Identify and apply suitable tools for various operations in lathe machine.
CO$_4$	Get the knowledge of working in machine shop such as milling machine, shapper etc.
CO$_5$	Study and practice on machine tools and their operations
CO$_6$	Acquire the Knowledge about safety in workshop and industry.

C106- CHEMISTRY

CO$_1$	Understand the basics of quantum mechanical concept.
CO$_2$	Apply the principles of spectroscopy in predicting absorption and relative terms in diatomic molecule.
CO$_3$	Evaluate the phase diagram of some one and two component systems by applying Phase Rule.
CO$_4$	Classify the organometallics .
CO$_5$	Analyse the quantitative aspects of fuel combustion by understanding the fundamental concepts of fuels.
CO$_6$	Evaluate the corrosion of a material by using the the fundamental concepts of corrosion chemistry.

C107-BASIC ELECTRONICS ENGINEERING

CO$_1$	Describe the basic concept of Semiconductors and PN junction diode
CO$_2$	Understand the working principle and characteristics of Transistor.
CO$_3$	Study the basic concept of FET, MOSFET and CMOS inverter.
CO$_4$	Classify the OP-AMP with its applications as Integrator, Differentiator & Summing Amplifier
CO$_5$	Relate the various Number systems and logic gates.
CO$_6$	Study about the basic combinational logic circuits and their implementations.

C108-BASICS OF CIVIL ENGINEERING

CO$_1$	Understand the property, use, advantage and disadvantage of diffent material used for construction.
CO$_2$	Analyse different types of materials will be used for construction, their proportions, different types of test & experiments and importance of quality.
CO$_3$	Analyse the importance of surveying, its requirements and applications in civil engineering.
CO$_4$	Differentiate the types of soil and its classifications, their properties, strengths and Types of foundations.
CO$_5$	Explain the ideas of Irrigation engineering and types of irrigation structures like: canals, siphons, weirs, dams etc.
CO$_6$	Learn about construction materials, role of transportation as well as of water and its conservation.

C109- MATHEMATICS-II

CO$_1$	Apply the knowledge of Laplace transformation and its use in getting solution to differential equations.
CO$_2$	Use of periodic functions and Fourier series, Fourier intergral
CO$_3$	Describe Fourier transform to analyze circuit and system communication.
CO$_4$	Illustrate the concept of vector differential calculus to understand the solenoidal and irrotational vectors
CO$_5$	Illustrate the concept of tangent and arclength,gradient.
CO$_6$	Solve the Vector differential and integral calculus problem.

C110-ENGINEERING MECHANICS

CO$_1$	Analize a system of forces acting on a rigid body.
CO$_2$	Apply the knowledge of parallel forces in determining the centroid and second moment of area of plain figures.
CO$_3$	Analyze planar and spatial systems to determine the forces in members of trusses and frames.
CO$_4$	Acquire the knowledge of space-time relationship of a body in motion and calculate the motion parameters under external forces.
CO$_5$	Apply the knowledge to analise the motion of a body under curvilininer motion.
CO$_6$	Study the motion of a rotational body under external forces.

C111-PROGRAMMING FOR PROBLEM SOLVING USING C

CO$_1$	Illustrate the flowchart and design an algorithm for a given problem and write a C Program
CO$_2$	Develop conditional and iterative statement to write c Program
CO$_3$	Exercise user defined functions to solve real-time problems
CO$_4$	Inscribe C programs that use pointers to access arrays, pointers and strings
CO$_5$	Exercise user defined datatypes including structures and unions to solve problems
CO$_6$	Exercise files concept to show input output of the file in C

C119- CHEMISTRY LAB

CO₁	Determine the amount of a compound / ion present in a given mixture / compound.
CO₂	Understand the Iodometric titrations.
CO₃	Analyse water sample to know some of its characteristics.
CO₄	Evaluate the suitability of a lubricant/fuel by determining some general property.
CO₅	Create a drug.
CO₆	Aplly the knowledge gained to determine the strength of a solution.

C120-BASICS OF ELECTRONICS ENGINEERING LAB

CO₁	Demonstrate and explain electronic components and electronic components.
CO₂	Compute the DC and AC resistance of diode with the help of VI characteristics.
CO₃	Design of Half Wave and Full Wave Rectifier.
CO₄	Analysis of positive , negative and biased clipper circuit .
CO₅	Demonstrate the design of inverting and non inverting amplifiers using the OPAMP.
CO₆	Extract logic gates and their usage in digital circuits

C121-BASICS OF CIVIL ENGINEERING LAB

CO₁	Determine the shape, size and Compressive strength of brick.
CO₂	Learn the testing of chain and measurement of correct length of the line, Bearing of a line.
CO₃	Know the importance of total station and its application.
CO₄	Determine Setting time of cement
CO₅	Evaluate the tensile strength of reinforcing steel.
CO₆	Calculate Compressive strength of concrete.

C122-ENGINEERING GRAPHICS AND DESIGN LAB

CO_1	Develop adequate competence in visualization, interpretation and expression of drawing of engineering parts and objects.
CO_2	Perform free hand sketching of basic geometrical constructions and multiple views of objects.
CO_3	Gain knowledge on universally accepted conventions and symbols for their usage in technical drawings.
CO_4	Draw orthographic projection of lines and plane surfaces.
CO_5	Draw projection of solids and perform development of surfaces.
CO_6	Gain knowledge about Computer aided drafting.

C123-PROGRAMMING FOR PROBLEM SOLVING USING C LAB

CO_1	Understand the basics of Electrical Laws which can be applied for solving electrical Circuits.
CO_2	Interpret and explain DC and AC circuits.
CO_3	Analyses Three phase circuits.
CO_4	Understand elementary idea of Magnetic Circuits.
CO_5	Classify various electrical Machines.
CO_6	Gain knowledge about the different Electrical Machines.

SECOND YEAR

C201- MATHEMATICS - III

CO_1	Identify, formulate formula and analyze complex engineering problems and they can solve it.
CO_2	Understand the processes of Interpolation of a polynomial by Lagrange, Newton divided, forward and backward difference.
CO_3	Gain knowledge to analyze and formulate the formula to compare the exact and approximate value of an integral by different rules.
CO_4	Solve an ordinary differential equation and a system of ordinary differential equations by using numerical Methods and extract the value of variables.
CO_5	Evaluate the probabilistic problems by defining the probability formula and use them to solve Probability problems.
CO_6	Gain knowledge about the Statistical hypothesis and analyze the regression and related them into estimate

C202-OBJECT ORIENTED PROGRAMMING USING JAVA

CO_1	**List** and use various Object Oriented Programming concepts for problem solving.
CO_2	**Describe** various fundamental tokens as well as linear data structure using object oriented programming.
CO_3	**Solve** problems on string and inheritance by applying different library function.
CO_4	**Analyze and Design** program based on concept of multithreading and abstraction
CO_5	**Evaluate** various GUI component using Applet and AWT to solve real world problem.
CO_6	**Design & Create** various application based on swing by using javafx.

C203-MECHANICS OF SOLIDS

CO_1	Explain the fundamental concepts of rigid and deformable solids in the perspective of stress, strain and modulus of elasticity.
CO_2	Apply the principles of bi-axial state of stresses in various problems, analysis of thin cylinder.
CO_3	Calculate the loads in beams, shear forces and bending moments associated with different sections.
CO_4	Illustrate the theory, principles associated to torsion in solid, hollow shafts, helical springs.
CO_5	Evaluation of deflection in beams by using by different methods.
CO_6	Analysis of different columns under different end conditions.

C204-FLUID MECHANICS AND HYDRAULIC MACHINES

CO_1	State and explain various fluid properties in rest and in transit.
CO_2	Understand concepts related to fluid statics.
CO_3	Apply the concepts of fluid kinematics to various types of fluid flow and flow lines also determine various flow parameters.
CO_4	Apply conservation laws to fluid flow problems in engineering applications.
CO_5	Analyses the fluid flow problems like flow through pipes, ducts and nozzles.
CO_6	Evaluate performance parameters of hydraulic machines like turbines and pumps.

C205-ORGANISATIONAL BEHAVIOUR

CO_1	Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.
CO_2	Demonstrate the applicability of analyzing the complexities associated with management of individual behavior in the organization.
CO_3	Analyze the complexities associated with management of the group behavior in the organization.
CO_4	Demonstrate how the organizational behavior can integrate in understanding the motivation (why) behind behavior of people in the organization.
CO_5	Evaluate the impact of different cultures with in an organization
CO_6	Develop a new technique to implement organizational change for the achievement of organizational goal.

C214-MECHANICS OF SOLIDS LAB

CO_1	Compute the tensile strength , compressive strength, shear strength of the specimen using different testing methods (UTM, Impact Test)
CO_2	Predict the bending stress, modulus of rigidity, fatigue strength of the given specimen using different testing methods
CO_3	Perform compression tests on spring and wood.
CO_4	Determine elastic constants using flexural and torsion tests
CO_5	Determine hardness of metals
CO_6	Perform strain and stress measurements using strain rosettes.

C215-OBJECT ORIENTED PROGRAMMING
USING JAVA LAB

CO_1	Understand OOP concepts and basics of Java programming.
CO_2	Create Java programs using inheritance and polymorphism.
CO_3	Implement error-handling techniques using exception handling and multithreading. database connection.
CO_4	Differentiate various collections.
CO_5	Build files and establish database connection.
CO_6	Develop GUI using Swing components.

C216-FLUID MECHANICS AND HYDRAULIC MACHINES LAB

CO_1	Determine stability of floating bodies.
CO_2	Determine flow coefficients of flow measuring devices.
CO_3	Analyze flow patterns occurring in pipe.
CO_4	Calculate force acting on vanes by using momentum conservation principle.
CO_5	Calculate head loss occurring in a pipe network.
CO_6	Evaluate performance parameters of turbines and pumps.

C313-EVALUATION OF SUMMER INTERNSHIP - I

CO_1	State the functioning of organization and observe changes for self-improvement.
CO_2	Explain how the internship placement site fits into a broader career field.
CO_3	Apply appropriate workplace behaviours in a professional setting.
CO_4	Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course.
CO_5	Evaluate the internship experience in terms of personal, educational and career needs.
CO_6	Develop ideas for suitable startups to become successful entrepreneur.

C206-ENGINEERING ECONOMICS

CO_1	Define the basic concept of micro and macroeconomics, engineering economics and their application in engineering economy.
CO_2	Understand the law of demand and law of supply.
CO_3	Understand the environment and financial systems of the country and its impact on business, society and enterprise.
CO_4	Analyze time value of money using engineering economy factors.
CO_5	Gain knowledge of economics and engineering principles to solve engineering problems and to evaluate engineering projects considering upon depreciation, taxes and inflation.
CO_6	Apply depreciation methods for individual/industrial/ public alternatives

C207-KINEMATICS & DYNAMICS OF MACHINES

CO_1	Understand various mechanisms, which can be used under different situations in different machines.
CO_2	Analyze and plot displacement, velocity and acceleration of different components of machines.
CO_3	Study of different mechanisims of gears and gear trains.
CO_4	Analyze and decide the type of drives to be used for different machinery applications.
CO_5	Determination of power for different clutches
CO_6	Evaluate the force analysis and power calculation of brakes & dynamometers.

C208-ENGINEERING THERMODYNAMICS

CO_1	Demonstrate an understanding of the concepts of first law of thermodynamics to identify closed and open systems .
CO_2	Apply the concept of second law to understand fundamental concepts of unsteady Flow, Entropy Generation and Property relations
CO_3	Develop a fundamental understanding of Reversible work, Exergy balance and Second Law Efficiency applied to various real life applications.
CO_4	Analyze the performance of gas and vapor power cycles and identify methods to improve thermodynamic performance.
CO_5	Solve problems based on the Brayton cycle; the Brayton cycle with regeneration; and the Brayton cycle with intercooling, reheating, and regeneration.
CO_6	Explain working principle of air compressors and their applications in engineering industry.

C209-INTRODUCTION TO PHYSICAL METALLURGY AND ENGINEERING MATERIAL

CO_1	Understand how materials are formed and their classification based on atomic arrangement.
CO_2	Describe the mechanical behavior of metallic systems and testing methods of materials.
CO_3	Acquire acquaintance with types of fracture and failure and methods of protection against the fractures.
CO_4	Know about the phase transformation of material.
CO_5	Understand different optical properties of Materials and description about plastics, ceramics and composite materials.
CO_6	Gain knowledge in various class of materials and their applications

C210-ADVANCED MECHANICS OF SOLIDS

CO_1	Perform stress and strain analyses for various load-bearing elements and structures under different loading conditions.
CO_2	Comprehend the behavior of structural elements under applied loads in elastic and plastic regimes, including unloading responses.
CO_3	Analyze elastic deformation using principal planes, stresses, and strains; apply theories of elastic failure for structural assessment.
CO_4	Design and dimension construction elements for a variety of loading scenarios, ensuring safety and performance.
CO_5	Calculate deflections of beams and shafts under static loads and evaluate stresses in thin-walled cylindrical and spherical vessels.
CO_6	Apply theoretical knowledge to real-world structural calculations and practical engineering problems.

C211-DATA STRUCTURE

CO_1	Explain the fundamental data structures and analyze the time and space complexities of algorithms.
CO_2	Select appropriate data structures to represent real-world problems effectively.
CO_3	Understand and apply linear data structures such as stacks, queues, and linked lists in practical scenarios.
CO_4	Design and implement tree-based data structures and optimize them using heaps for efficient data management.
CO_5	Analyze and implement various searching, sorting, and hashing techniques.
CO_6	Apply traversal techniques for binary trees and graphs, including BFS and DFS, to solve real-world problems.

C213-CONSTITUTION OF INDIA

CO1	Explain the meaning, significance, and evolution of constitutional law and constitutionalism in India.
CO2	Analyze the historical perspective, salient features, and characteristics of the Indian Constitution.
CO3	Interpret the schemes of Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy with their legal implications.
CO4	Evaluate the federal structure, distribution of powers, and the role of the President in India's parliamentary form of government.
CO5	Examine the process and significance of constitutional amendments and emergency provisions under the Indian Constitution.
CO6	Assess the constitutional provisions for local self-government and the scope of Fundamental Rights, including equality, freedom, and personal liberty.

**C218-KINEMATICS & DYNAMICS OF
MACHINES LAB**

CO_1	Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine and Petrol engine
CO_2	Study of steam power plant, gas turbine power plant and refrigeration system
CO_3	Study of refrigeration system
CO_4	Perform analysis of reciprocating air-compressor.
CO_5	Perform analysis of Centrifugal / Axial Flow compressor.
CO_6	Determine performance characteristics of gear pump

C219-ENGINEERING THERMODYNAMICS LAB

CO_1	Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine and Petrol engine
CO_2	Study of steam power plant, gas turbine power plant and refrigeration system
CO_3	Study of refrigeration system
CO_4	Perform analysis of reciprocating air-compressor.
CO_5	Perform analysis of Centrifugal / Axial Flow compressor.
CO_6	Determine performance characteristics of gear pump

**C220-INTRODUCTION TO PHYSICAL METALLURGY
AND ENGINEERING MATERIAL LAB**

CO_1	Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine and Petrol engine
CO_2	Study of steam power plant, gas turbine power plant and refrigeration system
CO_3	Study of refrigeration system
CO_4	Perform analysis of reciprocating air-compressor.
CO_5	Perform analysis of Centrifugal / Axial Flow compressor.
CO_6	Determine performance characteristics of gear pump

THIRD YEAR

C301-BASIC MANUFACTURING PROCESSES

CO₁	Select materials, types and allowances of patterns used in casting and analyze the foundry components.
CO₂	Study different arc, gas, solid state and resistance welding processes.
CO₃	Understand various non destructive testing methods.
CO₄	Describe different powder metallurgy processes.
CO₅	Develop process-maps for metal forming processes using plasticity principles.
CO₆	Explain various coating and deposition methods.

C302-MECHANISM & MACHINES

CO₁	Understand different mechanisims of lower pairs,higher pairs and construct diagram of different mechanisims.
CO₂	Interpret dynamic analysis of flywheel for engines as well as for different machines.
CO₃	Explain dynamic force analysis of gear mechanism.
CO₄	Develop concepts of speed control systems for engines, and gyro-stabilizers for ships and aeroplanes.
CO₅	Develop knowledge of analytical and graphical methods for calculating balancing of rotary and reciprocating masses.
CO₆	Develop understanding of vibrations and its significance on engineering design.

C303-HEAT TRANSFER

CO₁	Gain knowledge about the principles and mechanism of heat transfer in solids and fluids and solve problems on conduction, convection and radiation heat transfer.
CO₂	Analyze the mechanism of heat transfer through conduction mode and apply the knowledge of conduction heat transfer in designing of various heat transfer systems for industrial applications.
CO₃	Understand the mechanism of forced and free convection in fluids and apply the knowledge of convection heat transfer for evaluation of heat transfer coefficients in case of natural convection and forced convection over surfaces and inside ducts.
CO₄	Illustrate the real time applications of radiation mode of heat transfer.
CO₅	Comprehend the phenomena of heat transfer in boiling liquids and condensing Vapours and apply the knowledge in solving problems related to the industrial applications.
CO₆	Analyze the performance and develop the design skills of heat exchangers.

C304-AUTOMOBILE ENGINEERING

CO_1	Analyze the basic concepts and working principles of various automobilecomponents.
CO_2	Distinguish between various types of transmissions ystems, and rear axles.
CO_3	Explain the need of various conventional and automatic steering and braking systems.
CO_4	Understand the principles of different gear boxes and tyre geometry.
CO_5	Understand automotive electronics.
CO_6	Study latest developments in automobiles.

C305-NON CONVENTIONAL ENERGY SOURCES

CO_1	Understand the basic concepts and operation of renewable energy systems
CO_2	Remember the ideas and statistics of current RES availability and usage.
CO_3	Analyze the problems in RES installation in real time.
CO_4	Identify the other NCES and available sources improvement .
CO_5	Apply the renewable energy systems in real time applications.
CO_6	Implement knowledge wind and tidal energy in renewable energy applications

C311-UNIVERSAL HUMAN VALUES

CO_1	Explain the concept of holistic development and the role of education in achieving right understanding, relationships, and physical facility.
CO_2	Demonstrate self-exploration as a process for understanding value education and achieving continuous happiness and prosperity.
CO_3	Analyze the relationship between the self and the body, and distinguish their respective needs for a harmonious human life.
CO_4	Illustrate the foundational values of trust, respect, and justice in human-to-human relationships to achieve harmony in the family and society.
CO_5	Examine the interconnectedness and mutual fulfillment among the four orders of nature, and recognize harmony in nature and existence.
CO_6	Develop competence in professional ethics, ethical decision-making, and the ability to transition towards a value-based personal and professional life.

C313-EVALUATION OF SUMMER INTERNSHIP - II

CO$_1$	State the functioning of organization and observe changes for self-improvement.
CO$_2$	Explain how the internship placement site fits into a broader career field.
CO$_3$	Apply appropriate workplace behaviours in a professional setting.
CO$_4$	Solve real life challenges in the workplace by analysing work environment and conditions, and selecting appropriate skill sets acquired from the course.
CO$_5$	Evaluate the internship experience in terms of personal, educational and career needs.
CO$_6$	Develop ideas for suitable startups to become successful entrepreneur.

C314-MECHANISM & MACHINES LAB

CO$_1$	Determination of gyroscopic couple using gyroscopic test rig and performance of spring loaded governer.
CO$_2$	Determination of critical speed of rotating shaft.
CO$_3$	Perform static and dynamic balancing.
CO$_4$	Determination of natural frequencies of un-damped as well as damped vibrating systems.
CO$_5$	Study of interference and undercutting for gear drives
CO$_6$	Study of various cam and follower mechanisms.

C315-HEAT TRANSFER LAB

CO$_1$	Analysis of heat transfer by conduction in various commonly used materials.
CO$_2$	Measurement of the fin performance under natural/ forced convection.
CO$_3$	Measure the amount of heat transfer taking place between fluids flowing within heat exchangers.
CO$_4$	Aanalyze free and forced convection phenomenon.
CO$_5$	Demonstrate the concept of pool boiling.
CO$_6$	Demonstrate fundamental concepts of radiative heat transfer.

C316-BASIC MANUFACTURING PROCESSES LAB

CO_1	Test the properties of moldings sands.
CO_2	Study on different foundry practices.
CO_3	Determine strength of brazed and soldered joints.
CO_4	Fabricate joints using different welding practices.
CO_5	Perform different sheet metal operations.
CO_6	Perform different forming processes.

C306-DESIGN OF MACHINE ELEMENTS

CO_1	Explain basic concepts and principles in the design of machine elements & apply them effectively from material selection to design analysis
CO_2	Interpret standardized data by using design data book to analyze life of components under variousloading conditions..
CO_3	Explain and design permanent and temporary joints under various loading conditions.
CO_4	Design and analyze couplings and power transmission shafts for different conditions.conditions.
CO_5	Design helical compression spring and laminated spring
CO_6	Analyze operating conditions of Journal bearings, and use manufacturer's catalogue for selection of rolling contact bearings.

C307-MACHINING SCIENCE AND TECHNOLOGY

CO_1	Understand various tool geometries, their inter-relations and theories involved in metal cutting.
CO_2	Evaluate various machining parameters used in conventional machining processes.
CO_3	Apply concepts of kinematics in various machining processes to determine kinematic parameters.
CO_4	Explain mechanisms, of various conventional machining processes along with work and tool holding devices.
CO_5	Understand construction and working principle of various production machine tools.
CO_6	Understand the working principles, applications and importance of modern machining processes over conventional machining processes.

C308-OPTIMIZATION IN ENGINEERING

CO$_1$	Aanalyze the real life systems with limited constraints
CO$_2$	Depict the systems in a mathematical model form
CO$_3$	Apply knowledge of optimization to formulate and solve engineering problems.
CO$_4$	apply the theory of optimization methods and algorithms to develop and for solving various types of optimization problems
CO$_5$	solve the mathematical results and numerical techniques of optimization theory to concrete Engineering problems by using computer software
CO$_6$	Understand variety of real industrial problems such as resource allocation, production planning, assignment, transportation, travelling salesman etc. and solve these problems using linear programming approach using software

C309-SMART AND COMPOSITE MATERIALS

CO$_1$	Gain insight and exposure to advanced and innovative smart materials.
CO$_2$	Evaluate the properties of fiber reinforcements, polymer matrix materials, and commercial composites effectively.
CO$_3$	Acquire proficiency in composite manufacturing techniques and choose the suitable method for fiber-reinforced composite products.
CO$_4$	Analyze elastic properties, simulate mechanical performance, and predict failure behavior of fiber-reinforced composite laminates.
CO$_5$	Apply knowledge of composite performance and manufacturing to a comprehensive composites design project.
CO$_6$	Critically review literature and apply course knowledge in designing and implementing fiber-reinforced composite applications

C310-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING

CO$_1$	Demonstrate foundational knowledge of Artificial Intelligence concepts, methodologies, and practical applications.
CO$_2$	Apply various problem-solving techniques and search algorithms to address AI-based challenges effectively.
CO$_3$	Design and implement AI systems capable of making decisions in competitive or adversarial environments.
CO$_4$	Use First-Order Logic (FOL) for knowledge representation, reasoning, and inference in AI systems.
CO$_5$	Analyze and implement techniques for decision-making and reasoning in AI systems operating under uncertainty.
CO$_6$	Develop intelligent systems using advanced learning methods such as statistical learning, neural networks, and genetic algorithms.

C312-ESSENCE OF INDIAN KNOWLEDGE TRADITION - I

CO_1	Identify the fundamental concepts of Indian Traditional Knowledge and its historical evolution.
CO_2	Explain the relevance of Indian Traditional Knowledge through a modern scientific perspective.
CO_3	Analyze the contributions of Indian Traditional Knowledge to fields like medicine, agriculture, and architecture.
CO_4	Correlate traditional practices with contemporary scientific approaches to highlight their sustainability and utility.
CO_5	Evaluate the role of Indian Traditional Knowledge in addressing modern societal and environmental challenges.
CO_6	Demonstrate the ability to integrate Indian Traditional Knowledge with modern technologies for innovative solutions.

C317-DESIGN OF MACHINE ELEMENTS LAB

CO_1	Design and make any working model from cotter and knuckle joint and another working model from shaft, spring and bearing.
CO_2	Design and draw a riveted joint, cotter joint and knuckle joint using either Auto-cad/Pro-E/Catia/Ansys
CO_3	Design and anlyze shafts subjecte to combnied loading using either Auto-cad/Pro-E/Catia/Ansys
CO_4	Design and draw flange coupling using either Auto-cad /Pro-E/Catia/Ansys
CO_5	Design of spring using either Auto-cad/Pro-E /Catia/ Ansys
CO_6	Design of bearing using either Auto-cad/Pro-E /Catia/ Ansys

C318-MACHINING SCIENCE AND TECHNOLOGY LAB

CO_1	Perform various operations in lathe machine.
CO_2	Perform various operations in shaper,planner and grinding machine.
CO_3	Evaluate cutting force by using lathe tool dynamometer.
CO_4	Evaluate cutting force by using lathe drill dynamometer.
CO_5	Study various non conventional machining methods.
CO_6	Prepare jobs by using CNC machine.

C319-FUTURE READY CONTRIBUTOR PROGRAM

CO$_1$	Demonstrate a strong work ethic and essential professional thinking skills.
CO$_2$	Build confidence to contribute effectively in diverse job environments.
CO$_3$	Engage effectively in workplaces and handle challenges with resilience.
CO$_4$	Develop future-ready skills to navigate volatile career landscapes successfully.
CO$_5$	Explore diverse career opportunities, including unconventional professional pathways.
CO$_6$	Recognize and contribute positively to communities as technical professionals.

C320-SEMINAR-I

CO$_1$	Select topics on modern technology, prepare slides for power point presentation
CO$_2$	Gain good knowledge on modern technology by referring the journals/magazines
CO$_3$	Improvement in presention skill viz. clarity of voice, proper body language, interaction with audiance.
CO$_4$	Development of communication skills.
CO$_5$	Improve in demonstration knowledge, skills and in development of attitudes of a professional engineer.
CO$_6$	Learn to compile a detail report about presentation in the prescribed format.

FINAL YEAR

C401-INTELLECTUAL PROPERTY RIGHTS

CO$_1$	Recognize the fundamental of intellectual property Rights, Types, Need & importance of IPR.
CO$_2$	Understand the Registration Process of different IPs, legal and practical steps needed to ensure the different intellectual property rights remain valid and enforceable.
CO$_3$	Review ownership rights and marketing protection under intellectual property law as applicable to information, ideas
CO$_4$	Able to learn new products and product marketing to maintain Trade secret.
CO$_5$	Analyze the current and emerging issues relating to the intellectual property protection, GI, Unfair competition
CO$_6$	Development and reform of intellectual property rights and their likely impact on creativity and innovation.

C402-ENTERPRENEURSHIP DEVELOPMENT

CO$_1$	Communicate effectively both orally and in writing.
CO$_2$	Demonstrate knowledge of the legal and ethical environment impacting business organizations and exhibit an understanding and appreciation of the ethical implications of decisions.
CO$_3$	Demonstrate an understanding of and appreciation for the importance of the impact of globalization and diversity in modern organizations.
CO$_4$	Demonstrate an ability to engage in critical thinking by analyzing situations and constructing and selecting viable solutions to solve problems.
CO$_5$	Demonstrate an ability to work effectively with others.
CO$_6$	Demonstrate knowledge of current information, theories and models, and techniques and practices in all of the major business disciplines including the general areas of Accounting and Finance, Information Technologies, Management, Marketing, and Quantitative Analysis.

C403-PRODUCT DESIGN AND PRODUCTION
TOOLING (PDPT)

CO$_1$	Understand the various aspects of Product design.
CO$_2$	Demonstrate the various aspects of Process Planning.
CO$_3$	Analyze the different design parameters in case of Forging.
CO$_4$	Explain the different Sheet-metal working processes.
CO$_5$	Exhibit the various aspects of Jig and Fixtures design.
CO$_6$	Demonstrate the various aspects of Tool-design along with Limit-gauge design.

C404-REFRIGERATION AND AIR CONDITIONING

CO$_1$	Apply the concepts of thermodynamics to solve problems related to air refrigeration cycles. (L2)
CO$_2$	Analyze vapor compression refrigeration system and identify methods for performance improvement (L3).
CO$_3$	Study the working principles of vapor absorption and thermoelectric refrigeration systems
CO$_4$	Analyze the air conditioning processes using principles of psychometric (L4).
CO$_5$	Present the properties, applications and environmental issues of different refrigerants (L4).
CO$_6$	Evaluate cooling and heating loads in an air-conditioning system (L4).

C405- MICRO ELECTRONIC MECHANICAL SYSTEMS

CO_1	Investigate about basics of MEMS and microsystems.
CO_2	Apply knowledge about basics of MEMS to investigate about different micromachining techniques.
CO_3	Investigate about mechanics of deformable bodies and energy method.
CO_4	Design and model a electromechanical system and estimate the stiffness and damping of different micro-structures.
CO_5	Design different MEMS applications such as mechanical sensors and actuators.
CO_6	Apply the basics knowledge about MEMS to investigate about optical and radio-frequency MEMS.

C406-INTERNET OF THINGS

CO_1	Understand Importance of Safety and Important related Acts
CO_2	Apply Maintenance techniques as per requirements and able to compare for with different technique for better performance
CO_3	Understand wear and corrosion, its causes and remedial actions for preventions
CO_4	Demonstrate fault tracing, its methods and application
CO_5	Learn Periodic Maintenance, its type and application gives better work environments and helps industry from major shutdown
CO_6	Acquire knowledge of Preventive Maintenance, its type and application gives better work environments and helps industry from major shutdown

C407-ESSENCE OF INDIAN KNOWLEDGE TRADITION - II

CO_1	Identify the concept of traditional knowledge and explain its significance in society. (BL-1 & 2)
CO_2	Explain the need for protecting traditional knowledge and its importance for cultural preservation. (BL-2)
CO_3	Illustrate various legal enactments related to the protection of traditional knowledge. (BL-3)
CO_4	Analyze intellectual property concepts and their role in safeguarding traditional knowledge. (BL-4)
CO_5	Examine the role and importance of traditional knowledge in agriculture and medicine. (BL-5)
CO_6	Demonstrate an understanding of traditional knowledge systems and their application in sustainable development. (BL-2 & 3)

C408-MINOR PROJECT

CO$_1$	Identify & undertake projects which is feasible, cost effective, ecofriendly and safe.
CO$_2$	Analyze the relation of the project to the literature and how much the project is applicable to the society.
CO$_3$	Plan properly to complete the project within the schedule time.
CO$_4$	Conduct all relevant testings after execution of the project and analyze the test results for future research.
CO$_5$	Execute any project with proper methodology and in a team spirit.
CO$_6$	Compile project report as per standard norm.

C409-COMPREHENSSIVE VIVA-VOCE

CO$_1$	Demonstrate the understanding of engineering knowledge learnt in four year graduation course.
CO$_2$	Defend any type of interviews, viva-voce, and aptitude tests both at the academic and the industry sector.
CO$_3$	Perform well in group discussions and enhance the communications skills and interaction.
CO$_4$	Apply knowledge in developing their career in particular fields.
CO$_5$	Apply the principles and phenomena, and their applications in solving engineering problems.
CO$_6$	Exhibit professional etiquette suitable for career progression

C410-SEMINAR-II

CO$_1$	Select topics on modern technology, prepare slides for power point presentation
CO$_2$	Gain good knowledge on modern technology by referring the journals/magazines
CO$_3$	Improvement in presention skill viz. clarity of voice, proper body language, interaction with audiance.
CO$_4$	Development of communication skills.
CO$_5$	Improve in demonstration knowledge, skills and in development of attitudes of a professional engineer.
CO$_6$	Learn to compile a detail report about presentation in the prescribed format.

C411-INTERNSHIP / MAJOR PROJECT

CO_1	Identify & undertake projects which is feasible, cost effective, ecofriendly and safe.
CO_2	Analyze the relation of the project to the literature and how much the project is applicable to the society.
CO_3	Plan properly to complete the project within the schedule time.
CO_4	Conduct all relevant testings after execution of the project and analyze the test results for future research.
CO_5	Execute any project with proper methodology and in a team spirit.
CO_6	Develop confidence for self-education and ability for lifelong learning