

**G. PULLAIAH COLLEGE OF ENGINEERING AND TECHNOLOGY: KURNOOL**  
**DEPARTMENT OF MECHANICAL ENGINEERING**

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The following are the Course Outcomes of all the courses for the Academic Year 2020-2021  
from I-B.Tech to IV B.Tech  
**R20 REGULATION**

**I B.TECH I SEM**

**COURSE NAME: MATHEMATICS-I**

#	COURSE OUTCOMES
CO1	Apply the mathematical principles to solve first and second order differential equations
CO2	Analyze the non homogeneous linear differential equations of second and higher order along with Euler – Cauchy’s equations and Legendre’s linear equation
CO3	Apply the differential equations of second and higher order in various streams ---like Electrical Circuits, Simple Harmonic motion, Deflection of beams
CO4	Estimate the Taylors and Maclaurin series involving Maxima and minima of functions Consisting of 2 variables along with radius of curvature
CO5	Evaluate the multiple integrals involving double and triple integrals along with change of order of integration and apply the multiple integrals to areas and volumes in polar and Cartesian Coordinates.
CO6	Analyze the Concept of vector calculus involving divergence, curl, and green’s theorem, and Stokes and Gauss theorems.

Course Name: **ENGINEERING PHYSICS**

#	COURSE OUTCOMES
CO1	Understand the concepts of interference, diffraction, LASERS and propagation of light wave through an optical fiber.
CO2	Analyze the concepts of crystallography and Ultrasonic in various engineering fields.
CO3	Apply the concepts of Quantum Mechanics to solve Schrodinger’s wave equation and Eigen values, functions of a particle in a potential box.
CO4	Interpret the free electron theory along with equation of electrical conductivity and classification of solids.
CO5	Analyze the importance of semiconductors and magnetic materials in the functioning of electronic devices and in the emerging micro devices.
CO6	Illustrate the properties of superconductors along with their applications and also understand the physics of nano materials.

Course Name: **PYTHON PROGRAM**

#	COURSE OUTCOMES
CO1	Comprehend the fundamental concepts of computer hardware and problem solving.
CO2	Knowledge on the basic concepts of algorithms, flow charts and python programming.

CO3	Ability to analyze the procedure for providing input and acquire output from the program along with implementation of control statements.
CO4	Interpret the importance of functions in programming.
CO5	Analyze and modularize the problem and its solution by using functions.
CO6	Ability to relate the concepts of strings, files and pre-processors to the real world Applications.

Course Name: **COMMUNICATIVE ENGLISH**

#	COURSE OUTCOMES
CO1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO2	Apply grammatical structures to formulate sentences and correct word forms
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO6	Improve upon speaking skills over telephone, role plays and public speaking

Course Name: **ENGINEERING GRAPHICS AND COMPUTER AIDED DRAFTING**

#	COURSE OUTCOMES
CO1	Construct various curves like ellipse, parabola, hyperbola etc which are used in Engineering drawing.
CO2	Apply orthographic projection concepts to draw projections of points, lines, planes and solids
CO3	Apply development concepts to draw development of surfaces of simple solids
CO4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO5	Apply orthographic projection concepts to convert isometric view to orthographic views
CO6	Make use of AutoCAD Software to draw 2D diagrams of various objects

Course Name: **COMMUNICATIVE ENGLISH LAB**

#	COURSE OUTCOMES
CO1	Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
CO2	Apply communication skills through various language learning activities
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.

CO4	Evaluate and exhibit acceptable etiquette essential in social and professional settings
CO5	Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.
CO6	Improve upon speaking skills over telephone, role plays and public speaking

Course Name: **ENGINEERING PHYSICS LAB**

#	COURSE OUTCOMES
CO1	Understand the concept of interference by finding thickness of paper and radius of curvature of Plano-convex lens by forming Parallel fringes and Newton's rings.
CO2	Interpret the concept of diffraction by finding the wavelength of different colors of white light and LASER.
CO3	Examine the behavior of the ferromagnetic material by plotting B-H curve and verifies Biot-Savart's law by using Stewart-Gee's apparatus.
CO4	Analyze the propagation of a wave in a medium by determining the dispersive power of prism, acceptance angle, and numerical aperture of an optical fiber.
CO5	Interpret the nature of a semiconductor by determining its energy gap.
CO6	Demonstrate the concept of diffraction due to single slit by finding the width of the slit.

Course Name: **PYTHON PROGRAMMING LABORATORY**

#	COURSE OUTCOMES
CO1	Design solutions to mathematical problems & Organize the data for solving the problem
CO2	Understand and implement modular approach using python
CO3	Learn and implement various data structures provided by python library including string, list, dictionary and its operations etc
CO4	Understands about files and its applications.
CO5	Develop real-world applications, files and exception handling provided by python
CO6	Select appropriate programming construct for solving the problem

**I B.TECH II SEM**

Course Name: **MATHEMATICS-II**

#	COURSE OUTCOMES
CO1	Apply the mathematical principles to solve second and higher order differential equations.

CO2	Analyze the non- homogeneous linear differential equations along with method of variation of parameters.
CO3	Apply the concept of higher order differential equations to the various streams like Mass spring system and L-C-R Circuit problems.
CO4	Apply a range of techniques to find solutions of standard PDEs and basic properties of standard PDEs.
CO5	Analyze the vector calculus involving divergence, curl and their properties along with vector identities.
CO6	Apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals.

Course Name: **ENGINEERING CHEMISTRY**

#	COURSE OUTCOMES
CO1	Apply fundamental programming concepts of C for solving general purpose problems.
CO2	Implement functions for organized software development
CO3	Apply various operations on linear data structures.
CO4	Design techniques for efficient searching and sorting of a given application.
CO5	Develop programs on stacks and Queues for real time applications
CO6	Analyze Linear and nonlinear programming for efficiency.

Course Name: **DATA STRUCTURES**

#	COURSE OUTCOMES
CO1	Apply fundamental programming concepts of C for solving general purpose problems.
CO2	Implement functions for organized software development
CO3	Apply various operations on linear data structures.
CO4	Design techniques for efficient searching and sorting of a given application.
CO5	Develop programs on stacks and Queues for real time applications
CO6	Analyze Linear and nonlinear programming for efficiency.

Course Name: **ENGINEERING MECHANICS**

#	COURSE OUTCOMES
CO1	Analyze the basic concepts of rigid bodies subjected to different types of loads and supports.

CO2	Analyze the motion of the bodies considering friction and external loads.
CO3	Determine centroids, centre of gravity, moment of inertia of simple and composite figures.
CO4	Analyze the motion of particle without considering forces and considering forces, develop equations for different motions.
CO5	Apply Newton's laws and conservation laws to elastic collisions and motion of rigid bodies.
CO6	Analyze the perfect frames using different methods and concepts of Mechanical vibrations.

**Course Name: ENGINEERING WORKSHOP**

#	COURSE OUTCOMES
CO1	Apply wood working skills to make products.
CO2	Perform metal cutting operations in the fitting section to make models.
CO3	Perform simple welding operations to join to metal pieces.
CO4	Apply sheet metal working skills to make required models.
CO5	Evaluate the performance analysis of various pumps and turbines.
CO6	Perform general maintenance works on own at house/ work place.

**Course Name: ENGINEERING CHEMISTRY LAB**

#	COURSE OUTCOMES
CO1	Determine the cell constant and conductance of solutions
CO2	Prepare advanced polymer materials.
CO3	Determine the physical properties like surface tension, adsorption and viscosity
CO4	Estimate the Iron and Calcium in cement
CO5	Calculate the hardness of water and calculation of dissolved oxygen percentages
CO6	Determination of percentage of Iron in Cement sample by colorimetry

**Course Name: C AND DATA STRUCTURES LABORATORY**

#	COURSE OUTCOMES
CO1	Develop fundamental programs in C for solving general purpose problems
CO2	Implement functions for reusability and easy maintenance.
CO3	Apply various operations on linear data structures
CO4	Design techniques for efficient searching and sorting of a given application
CO5	Develop programs on stacks and Queues for real time applications.
CO6	Apply Linear and nonlinear programming for efficiency

**Course Name: APPLIED MECHANICS LABORATORY**

#	COURSE OUTCOMES
CO1	Acquire knowledge of static and dynamic behaviour of the bodies
CO2	Verify the Principle of moments using the bell crank lever apparatus.
CO3	Determine velocity ratio, mechanical advantage and efficiency of single and double gear crab
CO4	Determine the velocity ratio of the machine and to interpret the law of machine
CO5	Analyze the coefficient of static friction between two surfaces
CO6	Apply laws of mechanics to determine efficiency of simple machines with consideration of friction

**Course Name: UNIVERSAL HUMAN VALUES**

#	COURSE OUTCOMES
CO1	Understand the significance of value inputs in a classroom and start applying them in their life and profession
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.
CO3	Understand the value of harmonious relationship based on trust and respect in their life and profession
CO4	Understand the role of a human being in ensuring harmony in society and nature.
CO5	Distinguish between ethical and unethical practices, and start working out the strategy to

	actualize a harmonious environment wherever they work.
CO6	Analyze the value of maintaining ethical values in critical situations

## II B. TECH I SEM

Course Name: **TRANSFORM TECHNIQUES AND NUMERICAL METHODS**

#	COURSE OUTCOMES
CO1	Apply Laplace transforms to solve ordinary differential equations.
CO2	Build Fourier series and Fourier transforms of a given function.
CO3	Apply numerical methods to find our solution of algebraic equations using different methods under different conditions, and numerical solution of system of algebraic equations.
CO4	Understand and apply the concepts of curve fitting, numerical differentiation and integration
CO5	Interpret the numerical solutions of ordinary differential equations employing Taylor series, Euler's, Picard's and Runge-kutta methods
CO6	Apply Laplace transforms to solve ordinary differential equations.

Course Name: **THERMODYNAMICS**

#	COURSE OUTCOMES
CO1	Apply the concepts of thermodynamics in the form of Work and Heat to various engines
CO2	Make use of energy equations for steady flow of fluids.
CO3	Apply the thermodynamic laws to various applications.
CO4	Determine the efficiency of the cycles for various applications
CO5	Analyze basic laws of ideal gas, power cycles and refrigeration cycles for various applications
CO6	Apply Laplace transforms to solve ordinary differential equations.

Course Name: **MECHANICS OF SOLIDS**

#	COURSE OUTCOMES
CO1	Analyze the types of stresses, strains and elastic constants of mechanical components

CO2	Construct shear force and bending moment diagrams for beams subjected to various loads.
CO3	Formulate the bending and shear stress equations and shear stress distribution for beams and shafts
CO4	Solve problems related to slope and deflection equations for beams subjected to various loads
CO5	Estimate hoop and longitudinal stresses in thin and thick cylinders

Course Name: **MATERIAL SCIENCE AND ENGINEERING**

#	COURSE OUTCOMES
CO1	Identify the properties of the crystallization of ferrous and nonferrous materials.
CO2	Construct the equilibrium diagrams by experimental methods.
CO3	Make use of advanced composite materials in manufacturing of components and sophisticated machine.
CO4	Improve the properties of ferrous and nonferrous materials using different heat treatment processes.
CO5	Select the suitable materials for various engineering applications.

Course Name: **MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**

#	COURSE OUTCOMES
CO1	Analyze the concepts of managerial economics and financial accounting to make better decisions in the organization
CO2	Analyze the demand, production, cost and break even to know interrelationship among variables and their impact
CO3	Classify the market structure to decide the fixation of suitable price
CO4	Apply capital budgeting techniques to select best investment opportunity
CO5	Analyze and prepare financial statements to assess financial health of business.

Course Name: **MECHANICS OF SOLIDS LABORATORY**

#	COURSE OUTCOMES
CO1	Analyze the stress-strain diagram for different materials using universal testing machine
CO2	Compare the hardness values for various materials using hardness testing machine
CO3	Determine modulus of elasticity, bending stresses and deflection for different beams



CO4	Estimate the stiffness and shear modulus of springs using tension test
CO5	Asses the toughness and impact strength using impact testing machine.

Course Name: **MATERIAL SCIENCE AND ENGINEERING LABORATORY**

#	COURSE OUTCOMES
CO1	Make use of different material samples for investigating micro structures.
CO2	Interpret the microstructures of materials using metallurgical microscope
CO3	Measure the hardenability of mild steel samples.
CO4	Improve the properties of materials using various heat treatment processes.
CO5	Compare the properties of different materials with temperature variation.

Course Name: **COMPUTER AIDED DRAFTING LABORATORY**

#	COURSE OUTCOMES
CO1	Identify the commands in AutoCAD software to draw required objects
CO2	Create the mechanical components in 2 – Dimensional using AutoCAD commands
CO3	Draw the projections of solids using AutoCAD commands
CO4	Draw the sectional views of solids using AutoCAD commands
CO5	Draw the orthographic views of solids from isometric views using AutoCAD commands

Course Name: **SOLID WORKS (SKILL ORIENTED COURSE)**

#	COURSE OUTCOMES
CO1	Construct complex geometries of machine components in sketcher mode.
CO2	Demonstrate competency with multiple drawing and modification commands in Solid Works.
CO3	Plan 2D and 3D drawings based on design constraints
CO4	Create three-dimensional assemblies incorporating multiple solid models.
CO5	Apply industry standards in the preparation of technical mechanical drawings.

Course Name: **ENVIRONMENTAL SCIENCE**

#	COURSE OUTCOMES
CO1	Solve environmental problems through higher level of personal involvement and interest.

CO2	Apply ecological morals to keep up amicable connection among nature and human beings.
CO3	Recognize the interconnectedness of human dependence on the earth's ecosystems.
CO4	Apply environmental laws for the protection of environment and wildlife.
CO5	Influence society in proper utilization of goods and services

## II B. TECH II SEM

Course Name: **PROBABILITY AND STATISTICS**

#	COURSE OUTCOMES
CO1	Adopt correlation methods and principle of least squares, regression analysis.
CO2	Apply discrete and continuous probability distributions.
CO3	Classify the concepts of data science and its importance.
CO4	Interpret the association of characteristics and through correlation and regression tools.
CO5	Interpret the association of characteristics and through correlation and regression tools.

Course Name: **MANUFACTURING TECHNOLOGY**

#	COURSE OUTCOMES
CO1	Select suitable material for preparing the patterns
CO2	Make use of moulding systems to prepare a product
CO3	Recommend the melting and solidification processes for designing the gating system.
CO4	Identify the suitable special casting and welding processes used for the given application
CO5	Identify the process parameters and defects to get quality product

Course Name: **KINEMATICS OF MACHINERY**

#	COURSE OUTCOMES
CO1	Differentiate mechanism, machine and structure with respect to kinematic motions.

CO2	Analyse the mechanism of straight-line motion, steering and Hooke's joint as persuitable applications.
CO3	Draw velocity and acceleration diagrams by using relative velocity method and instantaneous center method.
CO4	Solve the problems related to gears and gear trains using suitable methods.
CO5	Analyze cam profile design with specified contour

Course Name: **I.C. ENGINES**

#	COURSE OUTCOMES
CO1	Identify constructional features and working principles of the S.I and C.I engines.
CO2	Analyze the stages of combustion in S.I and C.I engines for better performance.
CO3	Apply various performance methods to increase the engine efficiency.
CO4	Identify constructional features and working principles of air compressors.
CO5	select suitable automobile systems for internal combustion engine.

Course Name: **FLUID MECHANICS AND HYDRAULIC MACHINES**

#	COURSE OUTCOMES
CO1	Analyze properties of fluids under different conditions
CO2	Identify the fluid flow patterns using different equations
CO3	Determine fluid flow using devices and principles of fluid mechanics
CO4	Apply boundary layer concepts to various types of flow and forces exerted by jet on vanes
CO5	Estimate the performance of hydraulic turbines and pumps for various design considerations

Course Name: **ENGINEERING DRAWING FOR MECHANICAL ENGINEERS**

#	COURSE OUTCOMES
CO1	Apply orthographic projection concepts to draw projections of right regular solids.
CO2	Make use of sectional planes to draw sectional views of a solid.
CO3	Apply isometric projection concepts to draw isometric projections of right regular solids and sectioned solids.
CO4	Construct Intersection curves when one right regular solid penetrates another right regular solid.
CO5	Make use of perspective projection concepts to draw simple planes and right regular solids.

Course Name: **MANUFACTURING TECHNOLOGY LABORATORY**

#	COURSE OUTCOMES
CO1	Identify various casting and welding equipments used in manufacturing processes
CO2	Choose suitable Sand properties of green sand to get quality specimen.
CO3	Determine the sequence of process to complete a job
CO4	Make use of various welding, foundry and forming equipments to prepare the job
CO5	Apply pattern making procedure for casting process

Course Name: **FLUID MECHANICS AND HYDRAULIC MACHINES LABORATORY**

#	COURSE OUTCOMES
CO1	Analyze procedure for performance of various experiments
CO2	Calibrate flow discharge measuring devices used in pipes, channels and tanks.
CO3	Analyze the fluid flow through pipes with different materials and sizes.
CO4	Determine coefficient of discharge of fluid flow through pipes
CO5	Evaluate the performance analysis of various pumps and turbines.

Course Name: **I.C ENGINES LABORATORY**

#	COURSE OUTCOMES
CO1	Construct valve and port timing diagram of SI engine and CI engine.
CO2	Analyze the influence of variations in TDC and BDC operations of I.C engine
CO3	Calculate the power and efficiencies of I.C engines.
CO4	Test the performance of IC engine at various loads and Air fuel ratio.
CO5	Calculate the efficiency of reciprocating air compressor

Course Name: **COMPUTER AIDED DRAFTING LABORATORY**

#	COURSE OUTCOMES
CO1	Understand and interpret drawings of machine components so as to prepare assembly drawings either manually and using standard CAD packages.
CO2	Understand the basic analytical fundamentals that are used to create and manipulate geometric models in a computer program
CO3	Create 2D and 3D models of Engineering Components and gain practical experience in handling 2D drafting and 3D modelling software systems.
CO4	Apply the basic principles associated with CADD and to demonstrate common drafting techniques and shortcuts used by professionals.
CO5	Model the 3-D geometric information of machine components including assemblies, and automatically generate 2-D production drawings.

### III B. TECH I SEM

Course Name: **Thermal Engineering - II**

#	COURSE OUTCOMES
CO1	Apply power cycles and efficiency enhancement methods to generate power
CO2	Calculate the chimney height and draught for maximum discharge.
CO3	Determine the characteristics of flow through nozzle.
CO4	Construct the various velocity triangles of steam turbines
CO5	Analyze the working principle and performance of various thermal equipment

Course Name: **Dynamics of Machinery**

#	COURSE OUTCOMES
CO1	Apply gyro-principles to stabilize the motion of vehicle.
CO2	Analyse the forces of the Flywheel in IC Engine
CO3	Estimate the range of speeds of various governors suitable for applications.
CO4	Solve problems on balancing of rotating masses and reciprocating masses in V- engine and multi cylinder engines
CO5	Evaluate the critical speed of the shaft and simple vibration calculations of rotor systems

Course Name: **Design of Machine Elements**

#	COURSE OUTCOMES
CO1	Apply the design process and theories of failure for designing different machine elements
CO2	Solve the problems related to simple and complex components under different loads using Goodman's and Soderberg's criteria.
CO3	Estimate the stress induced in riveted and bolted joints under different load conditions.
CO4	Analyze the failures in shafts, cotter joint and knuckle joint subjected to various loads.
CO5	Design the keys, rigid and flexible couplings as per the standards suitable to applications

Course Name: **Machine Tools**

#	COURSE OUTCOMES
CO1	Identify the various machining processes and machine tools

CO2	Classify various metal cutting machines such as lathe, milling, and drilling, boring, grinding, shaping, Slotting and planer machines.
CO3	Choose the suitable tools for machining processes..
CO4	compare the constructional features of machines suitable for various machining Operations.
CO5	Categorize the components of the machines

Course Name: **Machine Tools Laboratory**

#	COURSE OUTCOMES
CO1	Identify various machine tools used in machine shop
CO2	Distinguish the Constructional features and operations of general purpose machines
CO3	Determine the sequence of operations to process a job
CO4	Make use of various machining operations to perform metal cutting
CO5	Prepare models using required machine tools

Course Name: **COCOMPUTER AIDED DRAFTING LABORATORY**

#	COURSE OUTCOMES
CO1	Identify the Commands in AutoCAD software to draw required objects
CO2	Create the mechanical Components in 2 – Dimensional using AutoCAD Commands
CO3	Draw the projections of solids using AutoCAD Commands
CO4	Draw the sectional views of solids using AutoCAD Commands
CO5	Draw the orthographic views of solids from isometric views using AutoCADCommands

### III B. TECH II SEM

Course Name: **Design of Machine Members – II**

#	COURSE OUTCOMES
CO1	Assess the type of stresses induced in crane hooks, C-clamps and drives subjected to various loadings.
CO2	Design different types of bearings for suitable applications
CO3	Design springs and power screws under different load Conditions as per the practical situation.
CO4	Solve the problems related to spur and helical gears for power transmission
CO5	Analyze the stresses induced in IC engine parts subjected to various loads

Course Name: **Heat Transfer**

#	COURSE OUTCOMES
CO1	Apply laws of heat transfer in thermal analyses of engineering systems.
CO2	Calculate the amount of heat transfer in Conduction, Convection and radiation modes.
CO3	Discuss the Concept of Conduction heat transfer and its applications
CO4	Analyze the free and forced Convective heat transfer for fluids
CO5	Analyze the Concept of radiative heat transfer between black bodies and grey bodies.

Course Name: **METAL FORMING PROCESS**

#	COURSE OUTCOMES
CO1	Apply hot working and cold working processes to work piece for obtaining a final product
CO2	Apply the mechanism of deformation for different metals
CO3	Analyze the effect of process parameters influencing metal forming
CO4	Identify the metal forming process used for given application
CO5	Examine effects of friction, lubrication and causes of common defects in metal forming

Course Name: **Non Conventional Source of Energy**

#	COURSE OUTCOMES
CO1	Identify various Conventional and non-Conventional sources of energy.
CO2	Estimate the energy Collection using suitable equipment
CO3	Compare different energy Conversion systems within the available resources for better utilization
CO4	Make use of the suitable energy storage methods for real-time requirements
CO5	Analyze the advanced power generation systems like Magneto Hydro Dynamics and other methods for future requirements.

Course Name: **Heat Transfer Laboratory**

#	COURSE OUTCOMES
CO1	Analyze thermal Conductivity in various materials
CO2	Calculate heat transfer Coefficient in various materials
CO3	Select appropriate materials for improving effectiveness of heat transfer.
CO4	Test the performance and there by improve effectiveness of heat exchanger
CO5	Calculate emissivity and Stefan's Boltzmann Constant for various bodies through radiation.

Course Name: **MATLAB**

#	COURSE OUTCOMES
CO1	Understand the use of software tools for modeling and analysis of mathematical Concepts for engineering applications

CO2	calculate the inverse of any matrix using MATLAB
CO3	Model and analyze Monte-Carlo simulation for suitable applications
CO4	Assess the Standard Normal Distribution and its importance in engineering applications
CO5	Model and analyze simple engineering Concepts and its importance in engineering applications

Course Name: **INDIAN CONSTITUTION**

#	COURSE OUTCOMES
CO1	Understand historical background of the Constitution making and its importance for building a democratic India.
CO2	Explain the role of President and Prime Minister.
CO3	Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
CO4	Understand the value of the fundamental rights and duties for becoming good citizen of India
CO5	Analyze the decentralization of power between central, state and local self-government.

#### IV B.Tech I-SEM

Course Name: **Unconventional Machining Process**

#	COURSE OUTCOMES
CO1	Apply the selection for processing of different materials and the range of applications with the importance of modern manufacturing technologies
CO2	Make use of the basic mechanism, working principle, process parameters, Applications, limitations and advantages of electro chemical machining(ECM), electrochemical grinding(ECG), & Chemical Machining CM
CO3	Apply the basic mechanism, working principle, process parameters, Applications, limitations and advantages of Electric Discharge machining
CO4	Analyze basic basic mechanism, working principle, process parameters, Applications, limitations and advantages of Electron Beam Machining( EBM) & Laser Beam Machining (LBM)3.
CO5	Applying the above mechanisms for various materials based on the application.

Course Name: **Finite Element Method**

#	COURSE OUTCOMES
CO1	Understand the concepts behind formulation methods in FEM.
CO2	Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
CO3	Develop element characteristic equation and generation of global equation.
CO4	Able to apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi symmetric and dynamic problems
CO5	Able to apply suitable boundary conditions to a global equation for solve them displacements, stress and strains induced



Course Name: **Additive Manufacturing**

#	COURSE OUTCOMES
CO1	History and Development of Additive manufacturing, Applications, and RP data formats.
CO2	Basic Concept Reverse Engineering and Software's for Additive Manufacturing.
CO3	Principle, Process, Materials, Advantages of Solid and Liquid Based AM Systems
CO4	Principle and Process of Selective Laser Sintering of Powder Based AM Systems.
CO5	Principle, Process, Advantages, Limitations, Applications of BPM, SDM, AM systems

Course Name: **Research Methodology**

#	COURSE OUTCOMES
CO1	Interpret the importance of literature survey to identify the research problem.
CO2	Develop suitable research methodologies to conduct engineering research.
CO3	Apply the principles of research to gather the required data from various sources.
CO4	Evaluate the gathered data by using appropriate statistical techniques.
CO5	Prepare and present the research report effectively with the help of visual aids.

Course Name: **Intellectual Property Rights**

#	COURSE OUTCOMES
CO1	Analyze ethical and professional issues which arise in the intellectual property law context.
CO2	Apply intellectual property law principles (including copyright, patents, designs and trademarks) to real problems.
CO3	Analyze the social impact of intellectual property law and policy.
CO4	Make use of copyrighted material so that it does not obstruct the progress of human knowledge.
CO5	Analyze IPR policies before filing patentable inventions and discoveries.

Course Name: **Operation Research**

#	COURSE OUTCOMES
CO1	Apply various Operations Research models and methods to real world problems.
CO2	Solve Linear Programming, assignment, sequencing, game theory, queuing, transportation and project management problems for optimum solution.
CO3	Evaluate various alternatives available to find optimal solution for real world problems.
CO4	Choose the best strategies to maximize the profit or minimize loss in the presence of a competitor.
CO5	Decide the best operating policy for the efficient use of resources.