MECHANICAL ENGINEERING (22 SCHEME)	
Course Code	BIDTK158/258 - INNOVATION and DESIGN THINKING
CO1	Appreciate various design process procedure
CO2	Generate and develop design ideas through different technique
CO3	Identify the significance of reverse Engineering to Understand products
CO4	Draw technical drawing for design ideas
Course Code	BCEDK103/203 - Computer Aided Engineering Drawing
CO1	Draw and communicate the objects with definite shape and dimensions
CO2	Recognize and Draw the shape and size of objects through different views
CO3	Develop the lateral surfaces of the object
CO4	Create a Drawing views using CAD software.
CO5	Identify the interdisciplinary engineering components or systems through its graphical representation.
Course Code	BEMEM103/203 - ELEMENTS OF MECHANICAL ENGINEERING
CO1	Explain the role of mechanical engineering in industry and society, fundamentals of steam and non-conventional energy sources
CO2	Describe different conventional and advanced machining processes, IC engines, propulsive devices, air-conditioning, refrigeration.
CO3	Explain different gear drives, gear trains, aspects of future mobility and fundamentals of robotics
CO4	Determine the condition of steam and its energy, performance parameters of IC engines, velocity ratio and power transmitted through power transmission systems.
Course Code	BESCK104D/204D - INTRODUCTION TO MECHANICAL ENGINEERING
C01	Explain the concepts of Role of Mechanical Engineering and Energy sources.
CO2	Describe the Machine Tool Operations and advanced Manufacturing process.

CO3	Explain the Working Principle of IC engines and EV vehicles.
CO4	Discuss the Properties of Common Engineering Materials and various Metal Joining Processes.
CO5	Explain the Concepts of Mechatronics, Robotics and Automation in IoT
Course Code	BETCK105E/205E -RENEWABLE ENERGY SOURCES
CO1	Describe the environmental aspects of renewable energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
CO2	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation.
CO3	Understand the conversion principles of wind and tidal energy
CO4	Understand the concept of biomass energy resources and green energy.
CO5	Acquire the basic knowledge of ocean thermal energy conversion and hydrogen energy.
Course Code	BME302 - MANUFACTRUING PROCESS
CO1	Describe the casting process and prepare different types of cast products. Acquire knowledge on Pattern, Core, Gating, Riser system and to use Jolt, Squeeze, and Sand Slinger Moulding machines.
CO2	Compare the Gas fired pit, Resistance, Coreless, Electrical and Cupola Metal Furnaces. Compare the Gravity, Pressure die, Centrifugal, Squeeze, slush and Continuous Metal mold castings.
CO3	Understand the Solidification process and Casting of Non-Ferrous Metals.
CO4	Describe the Metal Arc, TIG, MIG, Submerged and Atomic Hydrogen Welding processes etc. used in manufacturing.
CO5	Describe the methods of different joining processes and thermal effects in joining process
Course Code	BME303 - MATERIAL SCIENCE AND ENGINEERING
CO1	Understand the atomic arrangement in crystalline materials and describe the periodic arrangement of atoms in terms of unit cell parameters.

CO2	Understand the importance of phase diagrams and the phase transformations.
CO3	Explain various heat treatment methods for controlling the microstructure
CO4	Correlate between material properties with component design and identify various kinds of defects.
CO5	Apply the method of materials selection, material data and knowledge sources for computer- aided selection of materials.
Course Code	BME304 - BASIC THERMODYNAMICS
CO1	Explain fundamentals of thermodynamics and evaluate energy interactions across the boundary of thermodynamic systems.
CO2	Apply 1st law of thermodynamics to closed and open systems and determine quantity of energy transfers.
CO3	Evaluate the feasibility of cyclic and non-cyclic processes using 2nd law of thermodynamics : Apply the knowledge of entropy, reversibility and irreversibility to solve numerical problems and Interpret the behaviour of pure substances and its application in practical problems.
CO4	Recognize differences between ideal and real gases and evaluate thermodynamic properties of ideal and real gas mixtures using various relations.
Course Code	BMEL305 - Introduction to Modelling and Design for Manufacturing
CO1	Demonstrate their visualization skills.
CO2	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies. Make component drawings.
CO3	Produce the assembly drawings using part drawings.
CO4	Engage in lifelong learning using sketching and drawing as communication tool.
Course Code	BME306A - Electric and Hybrid Vehicle Technology
C01	Understand the architecture and vehicle dynamics of electric and hybrid vehicles
CO2	Analyze the power management systems for electric and hybrid vehicles
CO3	Understand different motor control strategies for electric and hybrid vehicles

CO4	Analyze various components of electric and hybrid vehicles with environment concern.
CO5	Understand the domain related grid interconnections of electric and hybrid vehicle.
Course Code	BME306B - Smart Materials & Systems
CO1	Apply the knowledge for materials characterisation
CO2	Evaluate the materials based on actuation
CO3	Select and justify appropriate materials for specific application
Course Code	BME306C - INTERNET OF THINGS
CO1	Explain the definition and usage of the term "Internet of Things" in different contexts
CO2	Understand the key components that make up an IoT system
CO3	Differentiate between the levels of the IoT stack and be familiar with the key technologies and protocols employed at each layer of the stack
CO4	Apply the knowledge and skills acquired during the course to build and test a complete, working IoT system involving prototyping, programming and data analysis
CO5	Understand where the IoT concept fits within the broader ICT industry and possible future
Course Code	BME306D - WASTE HANDLING & MANAGEMENT
CO1	Identify & segregate the waste
CO2	Formulate the appropriate waste segregation, collection & disposal system
CO3	Generate a report on waste management challenges
CO4	Select a remedial measure for environmental & living being protection
CO5	Exercise the constitution laws as a citizen
Course Code	BME358A - ADVANCED PYTHON PROGRAMMING
CO1	Develop algorithmic solutions to simple computational problems

CO2	Develop and execute simple Python programs
CO3	Use functions to decompose a Python program
CO4	Process compound data using Python data structures
CO5	Utilize Python packages in developing software applications
Course Code	BME358B - INTRODUCTION TO VIRTUAL REALITY
CO1	Describe how VR systems work and list the applications of VR.
CO2	Demonstrate the design and implementation of the hardware that enables VR systems to be built.
CO3	Understand the system of human vision and its implication on perception and rendering.
CO4	Explain the concepts of motion and tracking in VR systems.
CO5	Describe the importance of interaction and audio in VR systems.
Course	RME358C - SPDEADSHEET FOR ENCINEERS
Code	DIVIESSOC - SI READSHEET FOR ENGINEERS
CO1	Create different plots and charts
CO2	Compute different functions, conditional functions and make regression analysis
CO3	Carryout iterative solutions for roots, multiple roots, optimization and non-linear regression analysis
CO4	Carryout matrix operations
Course Code	BME358D - Tools in Scientific Computing
CO1	Understand the fundamentals of programming in scientific computations.
CO2	Develop programming for curve fitting and solving both linear and nonlinear equations.
CO3	Apply the concept of approximate methods and recognize their significance in computing.
CO4	Apply MATLAB/MATHCAD/FORTRAN/PYTHON tools, etc., for solving engineering problems
Course Code	BME401 - APPLIED THERMODYNAMICS
COI	Analyse air standard cycle to evaluate the performance of LC engines

CO2	Analyze the gas power cycles to evaluate the overall efficiency of gas turbine plant.
CO3	Apply thermodynamic concepts to analyze the performance of vapour power cycles.
CO4	Analyze the vapour compression and vapour absorption systems to improve refrigeration.
CO5	Determination of various parameters of air compressors and steam nozzles.
Course Code	BME402 - MACHINING SCIENCE & METROLOGY
CO1	Analyze various cutting parameters in metal cutting.
CO2	Understand the construction of machines & machine tools and compute the machining time of various operations.
CO3	Understand the concept of Temperature in Metal Cutting, forms of wear in metal cutting and Cutting fluids
CO4	Understand the objectives of metrology, methods of measurement, standards of measurement & various measurement parameters. Explain tolerance, limits of size, fits, geometric and position tolerances, gauges and their design
CO5	Understand the working principle of different types of comparators, gauges, angular Measurements
Course Code	BME403 - FLUID MECHANICS
CO1	Identify and calculate the key fluid properties used in the analysis of fluid behavior.
CO2	Understand and apply the principles of pressure, buoyancy and floatation
CO3	Apply the knowledge of fluid dynamics while addressing problems of mechanical and chemical engineering.
CO4	Understand the concept of boundary layer in fluid flow and apply dimensional analysis to form dimensionless numbers in terms of input output variables.
CO5	Understand the basic concept of compressible flow and CFD
CO6	Conduct basic experiments of fluid mechanics and understand the experimental uncertainties.
Course Code	BME404 - MECHANICAL MEASUREMENTS AND METROLOGY LAB
CO1	To calibrate pressure gauge, thermocouple, LVDT, load cell, micrometer.
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CO3	To demonstrate measurements using Optical Projector/Tool maker microscope, Optical flats.
CO4	To measure cutting tool forces using Lathe/Drill tool dynamometer.
CO5	To measure Screw thread parameters using 2-Wire or 3-Wire method, gear tooth profile using gear tooth vernier/Gear tooth micrometer.
CO6	To measure surface roughness using Tally Surf/ Mechanical Comparator.
Course Code	BME405A - NON TRADITIONAL MACHINING
CO1	Describe non-traditional machining process and compare with Traditional machining process. Recognize the need for Non-traditional machining process.
CO2	Describe the constructional features, performance parameters, process characteristics, applications, advantages, and limitations of USM, AJM and WJM.
CO3	Characterize the need of Chemical and electro-chemical machining process along with the constructional features, process parameters, process characteristics, applications, advantages, and limitations.
CO4	Illustrate the constructional feature of the equipment, process parameters, process characteristics, applications, advantages and limitations EDM & PAM
Course Code	BME405B - ENVIRONMENTAL STUDIES
CO1	Understand the basic concepts of environmental studies and natural resources.
CO2	Explain about the various eco-systems of nature.
CO3	Discuss different types of environmental pollutions and their control measures.
CO4	Explain the acquired knowledge about the various social aspects related to the environment.
Course Code	BME405C - MEMS-Micro Electro Mechanical Systems
CO1	Understand the working of MEMS technology & Miniaturization.
CO2	Explain the Process of Micro fabrication Techniques.
CO3	Explain the principles of system modelling.
CO4	Understand the working principles of Mechanical sensors and actuators.

Course Code	BME405D - ROBOTICS AND AUTOMATION
CO1	Explain various types of Robotics, automation, robotics motion, sensors and control, machine vision, robotic programming and roles of robots in industry.
CO2	Understand the working methodology of robotics and automation, motion and control, machine vision and programming, application of robots in industry.
CO3	Write the program for robot for various applications.
CO4	Describe the different material handling and Identification technologies used in automation
Course Code	BME456A - INTRODUCTION TO AI & ML
CO1	Understand the implementation procedures for the machine learning algorithms
CO2	Design Java/Python programs for various Learning algorithms.
CO3	Apply appropriate data sets to the Machine Learning algorithms
CO4	Identify and apply Machine Learning algorithms to solve real world problems
CO5	Examine working of PDF and word file formats
Course Code	BME456B - Digital Marketing
Course Code	BME456C - INTRODUCTION TO DATA ANALYTICS
CO1	Analyze data using tools and represent for visualization
CO2	Implement various statistical methods.
CO3	Understand and use decision tree and random forest algorithm
CO4	Understand and Implement T test and Anova
Course	BME456D - Introduction to programming in C++
COUC CO1	Apply Object Oriented Programming concepts in C++
CO2	Write a C++ program by applying knowledge of mathematics, science, and engineering.
CO3	Function on multi-disciplinary teams.
CO4	Identify, formulate, and solve engineering problems.