PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2020-21)

BTECH CIVIL ENGGINERING

PROGRAMME OUTCOME

PO1: Use the knowledge of mathematics and sciences to be applied in the field of Civil Engineering.
PO2: Identify and critically analyze problems related to Civil Engineering by using appropriate analytical tools and through literature review.
PO3: Investigate the identified problem, plan and perform experiment, case studies and practices and use the result, data from the literature, databases & relevant codes to solve identified engineering problems & provide valid conclusions.
PO4: Select and apply appropriate techniques, resources and modern tools in civil engineering activities & also understand the limitation.
PO5: Understand the need for sustainable development in the field civil engineering.
PO6: Understand norms of engineering and be committed to ethical and professional responsibilities of a Civil engineer.
PO7: Communicate effectively by giving and receiving clear instructions, through effective presentations with the civil engineering community and the society at large and be able to design documents and write effective reports.
PO8: Engage in life-long learning particularly in innovative and specialized technologies.
PO9: Communication: An ability to apply oral, written and graphical communication in both technical and non-technical environments and ability to use appropriate technical literature.
PO10: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the context of technological changes.

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	**KAS101T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes. 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent Streams.
	ENGINEERING CHEMISTRY	**KAS101T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.

ENGINEERING MATHEMATICS-I	**KAS103T**	CO 1. Remember the concept of matrices and apply for solving linear simultaneous equations. CO 2. Understand the concept of limit continuity and differentiability and apply in the study of Rolle,s, Lagrange,s and Cauchy mean value theorem and Leibnitz theorems . CO 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. CO 4. Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of gravity. CO 5. Remember the concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and volume integrals.
BASIC ELECTRICAL ENGINEERING	**KEE101T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. 5. Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC101T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of Operational amplifier 4. Understand the concept of measurement instrument. 5. Understand the working principle of different type of sensor and their uses. 6. Understand the concept of IoT system & Understand the component of IoT system.

PROGRAMMING FOR PROBLEM SOLVING	**KCS101T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language) 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach. 5. To use arrays, pointers and structures to develop algorithms and programs.
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME101T**	CO1. Understand the concept of stress and strain, factor of safety, beams. CO2. Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3. Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4. Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system. CO5.Understand concept of mechatronics with their advantages, scope and Industrial application, the different types of mechanical actuation system, the different types of hydraulic and pneumatic systems. CO6. Apply concepts of strength of material for safe design, refrigeration for calculation of COP, concepts of fluid mechanics in real life, concepts of measurements in production systems.
ENGINEERING PHYSICS LAB	**KAS151P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil. 4. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.

SEM I	**ENGINEERING CHEMISTRY LAB**	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials. 4. Calculate efficiency of a single phase transformer and DC machine. 5. Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction.
	ENGINEERING CHEMISTRY LAB	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials. 4. Calculate efficiency of a single phase transformer and DC machine. 5. Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction.

PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS151P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self education and ability for life-long learning needed for Computer language.
ENGLISH LANGUAGE LAB	**KAS154P**	basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/ administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional

ENGINEERING GRAPHICS & DESIGN LAB	**KCE151P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design. 6. Analysis of Isometric views. 7. Creating working drawings.
MECHANICAL WORKSHOP LAB	**KWS151P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop. CO4 Perform operations in welding, moulding, casting and gas cutting. CO5 Fabricate a job by 3D printing manufacturing technique.
ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC101**	CO1 Understand the evolution and various approaches of AI CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks. CO5 Understand the concepts of face, object, speech recognition and Robots.
EMERGING TECHNOLOGY FOR ENGINEERING	**KMC102**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones. CO5 Understand augmented reality (AR), virtual reality (VR), 5G technology, brain computer interface and human brain.

	SOFT SKILL I	**KNC101**	Unit 1- Students will be enabled to understand the correct usage of grammar. Unit 2- Students will apply the fundamental inputs of communication skills in making speech delivery, individual conference, and group communication. Unit 3-Students will evaluate the impact of interpersonal Communication on their performance as a professional and in obtaining professional excellence at the workplace. Unit 4-Skills and techniques of persuasion and negotiation would enhance the level of students at multifarious administrative and managerial platforms. Unit 5-Student will be able to equip with basics of communication skills and will apply it for practical and oral purposes by being honed up in presentation skills and voice-dynamics.
	ENGINEERING PHYSICS	**KAS201T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent streams.
	ENGINEERING CHEMISTRY	**KAS202T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.

ENGINEERING MATHEMATICS-II	**KAS203T**	CO 1 Understand the concept of differentiation and apply for solving differential equations. CO 2 Remember the concept of definite integral and apply for evaluating surface areas and volumes. K1, K3 & K5 CO 3 Understand the concept of convergence of sequence and series. Also evaluate Fourier series. CO 4 Illustrate the working methods of complex functions and apply for finding analytic functions. CO 5 Apply the concept of complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.
BASIC ELECTRICAL ENGINEERING	**KEE201T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ. them in different area of applications. 5. Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC201T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of perational amplifier 4. Understand the concept of measurement instrument. 5. Understand the working principle of different type of sensor and their uses. 6. Understand the concept of IoT system & Understand the component of IoT system.

PROGRAMMING FOR PROBLEM SOLVING	**KCS201T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language). 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach. 5. To use arrays, pointers and structures to develop algorithms and programs.
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME201T**	CO1 Understand the concept of stress and strain, factor of safety, beams. CO2 Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3 Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4 Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system. CO5 Understand concept of mechatronics with their advantages, scope and Industrial application, the different types of mechanical actuation system, the different types of hydraulic and pneumatic systems. CO6 Apply concepts of strength of material for safe design, refrigeration for calculation of COP, concepts of fluid mechanics in real life, concepts of measurements in production systems.
ENGINEERING PHYSICS LAB	**KAS251P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil. 4. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.

	ENGINEERING CHEMISTRY LAB	**KAS252P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity. 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
SEM II	**BASIC ELECTRICAL ENGINEERING LAB**	**KEE251P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials. 4. Calculate efficiency of a single phase transformer and DC machine. 5. Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction.
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS251P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self education and ability for life-long learning needed for Computer language.

ENGLISH LANGUAGE LAB	**KAS254P**	basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/ administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional
ENGINEERING GRAPHICS & DESIGN LAB	**KCE251P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design. 6. Analysis of Isometric views. 7. Creating working drawings.
MECHANICAL WORKSHOP LAB	**KWS251P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop. CO4 Perform operations in welding, moulding, casting and gas cutting. CO5 Fabricate a job by 3D printing manufacturing technique.

ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC201**	CO1 Understand the evolution and various approaches of AI. CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks. CO5 Understand the concepts of face, object, speech recognition and Robots.
EMERGING TECHNOLOGY FOR ENGINEERING	**KMC202**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones. CO5 Understand augmented reality (AR), virtual reality (VR), 5G technology, brain computer interface and human brain.
SOFT SKILL II	**KNC201**	Unit 1- Students will be able to converse well with effective LSRW skills in English. Unit 2- Students will evaluate the importance of conversation in their personal and professional domain and apply it for extending their professional frontiers. Unit 3- Students will learn to apply motivation skills for their individual and professional excellence. Unit 4- Students will utilize their teamwork and their interpersonal communication skills to survive and excel at their work-place. Unit 5-Students will learn to evaluate creativity for their professional innovation and critical thinking for their competence.

ENGG. MECHANICS	**KCE301**	1. Use scalar and vector analytical techniques for analyzing forces in statically determinate structures 2. Apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems. 3. Apply basic knowledge of mathematics and physics to solve real-world problems. 4. Understand basic dynamics concepts – force, momentum, work and energy. 5. Understand and be able to apply Newton's laws of motion.
SURVEYING AND GEOMATICS	**KCE302**	1. Describe the function of surveying and work with survey instruments, take observations, and prepare plan, profile, and cross-section and perform calculations. 2. Calculate, design and layout horizontal and vertical curves. 3. Operate a total station and GPS to measure distance, angles, and to calculate differences in elevation. Reduce data for application in a geographic information system. 4. Relate and apply principles of photogrammetry for surveying. 5. Apply principles of Remote Sensing and Digital Image Processing for Civil Engineering problems.
FLUID MECHANICS	**KCE303**	1. Understand the broad principles of fluid statics, kinematics and dynamics 2. Understand definitions of the basic terms used in fluid mechanics 3. Understand classifications of fluid flow 4. Apply the continuity, momentum and energy principles 5. Apply dimensional analysis

SEM III	**BUILDING PLANNING & DRAWING LAB**	**KCE351**	1. Introduction to the tools and commands of drafting software. 2. Working in layers, blocks, x-ref, drawing layout and print setup. 3. 3D drafting and rendering 4. Planning and drafting of elevation and cross section of door and window 5. Planning and drafting of plan and cross section of Dog legged and open well staircase. 6. Planning and Drawings of Residential building of 1 room set (plan and section). 7. Planning and drawing of 3 room residential building with staircase. 8. Preparation of details general arrangement drawing of 4 room duplex house including planning and drafting
	SURVEYING AND GEOMATICS LAB	**KCE352**	graphical method. 2. To find out reduced levels of given points using Auto/dumpy level. 3. To study parts of a Vernier and electronic theodolite and measurement of horizontal and vertical angle. 4. To measure horizontal angle between two objects by repetition/ reiteration method. 5. To determine the height of a vertical structure (e.g. chimney/ water tank etc.) using trigonometrical leveling by taking observations in single vertical plane. 6. To set out a simple circular curve by Rankine's method. 7. Demonstration and working on Electronic Total Station. Measurement of distances, horizontal & vertical angles, coordinates and area of a land parcel. 8. Demonstration and working with Mirror stereoscopes, Parallax bar and Aerial photographs. 9. Visual Interpretation of standard FCC (False colour composite). 10. Digitization of physical features on a map/image using GIS software. 11. Coordinates measurement using GPS.

	FLUID MECHANICS LAB	**KCE353**	experimental set-up on impact of jet. 2. To determine the coefficient of discharge of an orifice of a given shape. Also to determine the coefficient of velocity and the coefficient of contraction of the orifice mouth piece. 3. To calibrate an orifice meter and study the variation of the co-efficient of discharge with the Reynolds number. 4. To calibrate a Venturimeter and study the variation of the co-efficient of discharge with the Reynolds number. 5. To calibrate a bend meter and study the variation of the co-efficient of discharge with the Reynolds number. 6. Verification of Bernoulli's Theorem 7. To study the transition from laminar to turbulent flow and to determine the lower critical Reynolds number. 8. To study the velocity distribution in a pipe and also to compute the discharge by integrating the velocity profile. 9. To study the variation of friction factor, 'f' for turbulent flow in commercial pipes. 10. To study the boundary layer velocity profile over a flat plate and to determine the boundary layer thickness. 11. To determine Meta-centric height of a given
SEM IV	**MATERIALS, TESTING & CONSTRUCTION PRACTICES**	**KCE401**	1. Identify various building materials and to understand their basic properties. 2. Understand the use of non-conventional civil engineering materials. 3. Study suitable type of flooring and roofing in the construction process. 4. Characterize the concept of plastering, pointing and various other building services. 5. Exemplify the various fire protection, sound and thermal insulation techniques, maintenance and repair of buildings.
	INTRODUCTION TO SOLID MECHANICS	**KCE402**	1. Describe the concepts and principles of stresses and strains. 2. Analyze solid mechanics problems using classical methods and energy methods. 3. Analyze structural members subjected to combined stresses. 4. Calculate the deflections at any point on a beam subjected to a combination of loads. 5. Understand the behavior of columns, springs and cylinders against loads.

	HYDRAULIC ENGINEERING AND MACHINES	**KCE403**	1. Apply their knowledge of fluid mechanics in addressing problems in open channels. 2. Solve problems in uniform, gradually and rapidly varied flows in steady state conditions. 3. Have knowledge in hydraulic machineries like pumps and turbines.
	Geotechnical Engineering	**KCE 501**	CO-1 Classify the soil and determine its Index properties. CO-2 Evaluate permeability and seepage properties of soil. CO-3 Interpret the compaction and consolidation characteristics & effective stress concept of soil. CO-4 Determine the vertical and shear stress under different loading conditions and explain the phenomenon of soil liquefaction. CO-5 Interpret the earth pressure and related slope failures.
	Structural Analysis	**KCE 502**	• CO-1 Explain type of structures and method for their analysis. • CO-2 Analyze different types of trusses for member forces. • CO-3 Compute slope and deflection in determinate structures using different methods. • CO-4 Apply the concept of influence lines and moving loads to compute bending moment and shear force at different sections • CO-5 Analyze determinate arches for different loading conditions
	Quantity Estimation and Construction Management	**KCE 503**	CO-1 Understand the importance of units of measurement and preliminary estimate for administrative approval of projects. CO-2 Understand the contracts and tender documents in construction projects. CO-3 Analyze and assess the quantity of materials required for civil engineering works as per specifications. CO 4 Evaluate and estimate the cost of expenditure and prepare a detailed rate analysis report. CO-5 Analyze and choose cost effective approach for civil engineering projects.

SEM V	**Concrete Technology**	**KCE 051**	CO-1 Understand the properties of constituent material of concrete. CO-2 Apply admixtures to enhance the properties of concrete. CO-3 Evaluate the strength and durability parameters of concrete. CO-4 Design the concrete mix for various strengths using difference methods. CO-5 Use advanced concrete types in construction industry.
	Modern Construction Materials	**KCE 052**	CO-1 Understand the use of modern construction materials. CO-2 Use geosynthetics and bituminous materials in constructions. CO-3 Apply knowledge of modern materials in production of variety of concrete. CO-4 Apply knowledge of composites and chemicals in production of modern concrete. CO-5 Use modern water proofing and insulating materials in constructions
	Open Channel Flow	**KCE 053**	CO-1 Apply knowledge of fluid flow for designing of channel sections. CO-2 Analyze the gradually varied flow in channel section. \CO-3 Analyze the rapidly varied flow in channel sections. CO-4 Apply numerical methods for profile computation in channels. CO-5 Design channels for sub critical and super critical flows.
	Engineering Geology	**KCE 054**	CO-1 Understand the scope of geological studies. CO-2 Understand the rocks and its engineering properties. CO-3 Understand the minerals and constituents of rocks. CO-4 Understand the rock deformations, their causes effects and preventive measures. CO-5 Understand the ground water reserves, Geophysical exploration methods and site selection for mega projects. Unit

Engineering Hydrology	**KCE 055**	CO-1 Understand the basic concept of hydrological cycle and its various phases. CO-2 Understand the concept of runoff and apply the knowledge to construct the hydrograph. CO-3 Apply the various methods to assess the flood. CO-4 Assess the quality of various forms of water and their aquifer properties. CO-5 Understand the well hydraulics and apply ground water modelling techniques
Sensor and Instrumentation Technologies for Civil Engineering Applications	**KCE 056**	CO-1 Analyze the errors during measurements CO-2 Describe the measurement of electrical variables CO-3 Describe the requirements during the transmission of measured signals CO-4 Construct Instrumentation/Computer Networks CO-5 Suggest proper sensor technologies for specific applications CO-6 Design and set up measurement systems and do the studies
Air and Noise Pollution Control	**KCE 057**	CO-1 Understand air pollutants and their impacts. CO-2 Explain air pollution chemistry and meteorological aspects of air pollutants. CO-3 Demonstrate methods for controlling particulate air pollutants. CO-4 Demonstrate methods for controlling gaseous air pollutants. CO-5 Understand automotive emission standards. CO-6 Apply methods for controlling noise pollution.

	GIS and Advance Remote Sensing	**KCE 058**	CO-1 Understand the concepts of Photogrametry and compute the heights of objects CO-2 Understand the principles of aerial and satellite remote sensing, Able to comprehend the energy interactions with earth surface features, spectral properties of water bodies . CO-3 Understand the basic concept of GIS and its applications, know different types of data representation in GIS CO-4 Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are CO-5 Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems CO-6 Apply knowledge of GIS and understand the integration of Remote Sensing and GIS
	Design of Concrete Structures	**KCE 601**	CO-1 Analyse and Design RCC beams for flexure by IS methods. CO-2 Analyse and Design RCC beams for shear by IS methods. CO-3 Analyse and Design RCC slabs and staircase by IS methods. CO-4 Design the RCC compression members by IS methods. CO-5 Design various types of footings and cantilever retaining wall
	Transportation Engineering	**KCE 602**	CO-1 Understand the history of road development , their alignment & Survey. CO-2 Design the various geometric parameters of road. CO-3 Study the traffic characteristics & design of road intersections & signals. CO-4 Examine the properties of highway materials & their implementation in design of pavements. CO-5 Learn methods to construct various types of roads.
	Environmental Engineering	**KCE 603**	CO-1 Assess water demand and optimal size of water mains. CO-2 Layout the distribution system & assess the capacity of reservoir. CO-3 Investigate physical, chemical & biological parameter of water. CO-4 Design treatment units for water and waste water. CO-5 Apply emerging technologies for treatment of waste water

SEM VI	**Advance Structural Analysis**	**KCE 061**	CO-1 Analyze indeterminate structure to calculate unknown forces, slope and deflections by different methods. CO-2 Apply principle of influence lines to analyze indeterminate beams and arches. CO-3 Analyze and design cable structure with their influence line diagram. CO-4 Apply basics of force and stiffness methods of matrix analysis for beams, frames and trusses. CO-5 Apply the basic of plastic analysis to analyze the structure by using different mechanism.
	River Engineering	**KCE 062**	CO-1 Explain river morphology and its classification. CO-2 Explain hydraulic geometry and behavior of river. CO-3 Explain socio-cultural influences and ethics of stream restorations. CO-4 Analyze flow and sediment transport in rivers and channels. CO-5 Design guide band, embankments and flood protection systems
	Repair and Rehabilitation of Structures	**KCE 063**	CO-1 Understand the fundamentals of maintenance and repair strategies. CO-2 Identify for serviceability and durability aspects of concrete. CO-3 Know the materials and techniques used for repair of structures. CO-4 Decide the appropriate repair and retrofitting techniques. CO-5 Use appropriate health monitoring technique and demolition methods
	Foundation Design	**KCE 064**	CO-1 Understand various methods of Soil Exploration and its importance. CO-2 Analyze bearing capacity and settlement of soil for shallow foundation. CO-3 Design the various types of shallow foundation and understand the basics of deep foundation. CO-4 Understand the characteristics of well foundations and retaining wall. CO-5 Understand the concept of soil reinforcement.

	Rural Development Engineering	RCE072	To introduction about Rural Development Planning and Concept of Appropriate Technology, Scope,Rural,development programme/ projects. To study about Rural Housing: Low cost construction materials,Composite material - ferro-cement & fly ash,Earthquake resistant measures for low cost houses. Water Supply and Rural Sanitation: Sources of water. BIS & WHO water standards. Low Cost Roads and Transport: Broad categories of Pavement Layers, types of Granular Sub-Bases and Bases, Low Cost Irrigation: Consideration of low cost irrigation techniques , drip & sprinkler irrigation systems
	Railways, Airport & Water Ways	RCE076	Understand the history of railway development, their alignment & Survey. Design the various geometric parameters of railway. Study the traffic characteristics & design of railways, water ways intersections & signals. Examine the properties of railways, airport, water ways materials & their implementation in design parameter. Learn methods to construct various types of railways route, water ways, airport.
SEM VII	Design of Structure-III	RCE701	ntroduction of Steel structure, its section. Design of connections (Bolted and welded). Design of Riveted connections. Analysis and design of single and double section tension members with Gusset plate. Study of lug angles and Splices. Analysis and design of compression members subjected to axial loads. Concept of Lacing and Battening. To study behavior of Roof trusses and their terminologies. Concept of Purlin and Principle rafter. Introduction to column bases, design of slab base and concrete block. Analysis and design simply supported laterally restrained steel beams. Introduction to plate girders and functions of various elements of a plate girder. Fabrication and erection of steel structures.

	Water Resources	RCE702	Understanding the importance of Hydrology and Irrigation System. Designing of Irrigation Channels and Concepts of Lining in Channel. Concepts of Regulation works and study of Irrigation Outlet and River Training Works. K2, K3, Application of Canal Head Works and Cross Drainage Works. Analysis of Dams and Spillways and to study about the Hydroelectric Power Generation
SEM VIII	Solid Waste Management	RCE084	Solid waste management Public health and ecological impacts. Transportation: handcart, tri-cycle, animal cart, tripper truck, dumper placer, bulk refuse. Landfilling,Site selection criteria, landfill layout, landfill sections, Occurrence of gases. To study about Composting, types of composting, process description, design and operational consideration Introduction to Electronic waste and Biomedical waste and their disposal..
	Engineering Hydrology and Ground Water Management	RCE085	Understand the concept of Hydrology and applications of Precipitation. To study about Hydrographs and concepts of Run Off. Analysis of Flood and Flood Routing. Study and applications of Ground Water Management. To observe Ground water quality and behaviour of water wells

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2020-21)

BTECH COMPUTER SCIENCE ENGGINERING

PROGRAMME OUTCOME

PO1:The graduates are expected to develop an ability to apply knowledge of mathematics, science and engineering appropriate to the discipline.

PO2:The graduates are expected to apply mathematical foundations, algorithmic principles and computer science theory in modeling, design and conduct of experiments as well as data interpretation and analysis.

PO3:The graduates are expected to develop an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.

PO4:The graduates are expected to develop an ability to identify, formulate and solve real engineering problems and understand the global impact of engineering solutions.

PO5:The graduates are expected to develop an ability to function effectively on multidisciplinary teams to accomplish a common goal.

PO6:The graduates are expected to develop an understanding of professional, ethical, legal, security and social issues as well as responsibilities.

PO7:The graduates should have good knowledge of contemporary issues and are expected to communicate effectively with a range of audiences.

PO8:The graduates should be able to recognize the need for lifelong learning and are expected to apply the techniques, skills and modern engineering tools necessary for engineering practice.

PROGRAM SPECIFIC OUTCOMES

PSO1:Apply the fundamentals of mathematics, science and engineering knowledge to understand, analyze and develop computer programs in the areas related to algorithms, multimedia, big data analytics, machine learning, artificial intelligence and networking for efficient design of computer-based systems of varying complexity.

PSO2:Apply appropriate techniques and modern engineering hardware and software tools for the design and integration of computer system and related technologies, to engage in lifelong learning for the advancement of technology and its adaptation in multi-disciplinary environments.

PSO3:Implementation of professional engineering solutions for the betterment of society keeping the environmental context in mind, be aware of professional ethics and be able to communicate effectively.

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	**KAS101T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes. 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory.
	ENGINEERING CHEMISTRY	**KAS101T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water.
	ENGINEERING MATHEMATICS-I	**KAS103T**	CO 1. Remember the concept of matrices and apply for solving linear simultaneous equations. CO 2. Understand the concept of limit continuity

		and differentiability and apply in the study of Rolle,s, Lagrange,s and Cauchy mean value theorem and Leibnitz theorems . CO 3. Identify the application of partial differentiation and apply for
BASIC ELECTRICAL ENGINEERING	**KEE101T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC101T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of Operational amplifier 4. Understand the concept of measurement
PROGRAMMING FOR PROBLEM SOLVING	**KCS101T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language) 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME101T**	CO1. Understand the concept of stress and strain, factor of safety, beams. CO2. Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3. Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4. Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system.
ENGINEERING PHYSICS LAB	**KAS151P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field

	ENGINEERING CHEMISTRY LAB	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials.
SEM I	**ENGINEERING CHEMISTRY LAB**	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS151P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in

ENGLISH LANGUAGE LAB	**KAS154P**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/ administrative communication and use it for document/project/report/research paper
ENGINEERING GRAPHICS & DESIGN LAB	**KCE151P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design.
MECHANICAL WORKSHOP LAB	**KWS151P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop.
ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC101**	CO1 Understand the evolution and various approaches of AI CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural
EMERGING TECHNOLOGY FOR ENGINEERING	**KMC102**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends

	SOFT SKILL I	**KNC101**	the correct usage of grammar. Unit 2- Students will apply the fundamental inputs of communication skills in making speech delivery, individual conference, and group communication. Unit 3-Students will evaluate the impact of interpersonal Communication on their performance as a professional and in obtaining professional excellence at the workplace. Unit 4-Skills and techniques of persuasion and negotiation would enhance the level of students
	ENGINEERING PHYSICS	**KAS201T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory.
	ENGINEERING CHEMISTRY	**KAS202T**	2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.
	ENGINEERING MATHEMATICS-II	**KAS203T**	CO 1 Understand the concept of differentiation and apply for solving differential equations. CO 2 Remember the concept of definite integral and apply for evaluating surface areas and volumes. K1, K3 & K5 CO 3 Understand the concept of convergence of sequence and series. Also evaluate Fourier series.
	BASIC ELECTRICAL ENGINEERING	**KEE201T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction
	EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC201T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of perational amplifier 4. Understand the concept of measurement

	PROGRAMMING FOR PROBLEM SOLVING	**KCS201T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language). 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and
	FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME201T**	CO1 Understand the concept of stress and strain, factor of safety, beams. CO2 Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3 Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4 Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system. CO5 Understand concept of mechatronics with
	ENGINEERING PHYSICS LAB	**KAS251P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
	ENGINEERING CHEMISTRY LAB	**KAS252P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity. 3. Measure conductance of solution, chloride and iron content in water, hardness of water.
SEM II	**BASIC ELECTRICAL ENGINEERING LAB**	**KEE251P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials.

PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS251P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in
ENGLISH LANGUAGE LAB	**KAS254P**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/ administrative communication and use it for document/project/report/research paper
ENGINEERING GRAPHICS & DESIGN LAB	**KCE251P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design.
MECHANICAL WORKSHOP LAB	**KWS251P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop.
ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC201**	CO1 Understand the evolution and various approaches of AI. CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural

	EMERGING TECHNOLOGY FOR ENGINEERING	**KMC202**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends
	SOFT SKILL II	**KNC201**	with effective LSRW skills in English. Unit 2- Students will evaluate the importance of conversation in their personal and professional domain and apply it for extending their professional frontiers. Unit 3- Students will learn to apply motivation skills for their individual and professional excellence. Unit 4- Students will utilize their teamwork and
SEM III	**Data Structure**	**KCS301**	Describe how arrays, linked lists, stacks, queues, trees, and graphs are represented in memory, used by the algorithms and their common applications. Discuss the computational efficiency of the sorting and searching algorithms. Implementation of Trees and Graphs and perform various operations on these data structure.
	Computer Organization and Architecture	**KCS302**	CO 1 Study of the basic structure and operation of a digital computer system. K1, K2 CO 2Analysis of the design of arithmetic & logic unit and understanding of the fixed point and floating point arithmetic operations. CO 3 Implementation of control unit techniques and the concept of Pipelining K3 CO 4 Understanding the hierarchical memory
	Discrete Structures & Theory of Logic	**KCS303**	and determine if the argument is or is not valid. K3, K4 CO 2 Understand the basic principles of sets and operations in sets. K1, K2 CO 3Demonstrate an understanding of relations and functions and be able to determine their properties.
	Operating Systems	**KCS401**	CO 1 Understand the structure and functions of OS K1, K2 CO 2 Learn about Processes, Threads and Scheduling algorithms. K1, K2 CO 3 Understand the principles of concurrency

SEM IV	**Theory of Automata and Formal Languages**	**KCS402**	CO 1 Analyse and design finite automata, pushdown automata, Turing machines, formal languages, and grammars K4, K6 CO 2 Analyse and design, Turing machines, formal languages, and grammars K4, K6 CO 3 Demonstrate the understanding of key notions, such as algorithm, computability, decidability,
	Microprocessor	**KCS403**	Apply a basic concept of digital fundamentals to Microprocessor based personal computer system. K3, K4 CO 2 Analyze a detailed s/w & h/w structure of the Microprocessor. K2,K4 CO 3 Illustrate how the different peripherals (8085/8086) are interfaced with Microprocessor.
	Database Management System	**KCS501**	CO 1 Apply knowledge of database for real life applications. K3 CO 2 Apply query processing techniques to automate the real time problems of databases. K3, K4 CO 3 Identify and solve the redundancy problem in database tables using normalization. K2, K3 CO 4 Understand the concepts of transactions, their processing so they will familiar with broad range

Compiler Design	**KCS502**	CO 1 Acquire knowledge of different phases and passes of the compiler and also able to use the compiler tools like LEX, YACC, etc. Students will also be able to design different types of compiler tools to meet the requirements of the realistic constraints of compilers. K3, K6 CO 2 Understand the parser and its types i.e. Top-Down and Bottom-up parsers and construction of LL, SLR, CLR, and LALR parsing table. K2, K6 CO 3 Implement the compiler using syntax-directed translation method and get knowledge about the synthesized and inherited attributes. K4, K5 CO 4 Acquire knowledge about run time data structure
Design and Analysis of Algorithm	**KCS503**	CO 1 Design new algorithms, prove them correct, and analyze their asymptotic and absolute runtime and memory demands. K4, K6 CO 2 Find an algorithm to solve the problem (create) and prove that the algorithm solves the problem correctly (validate). K5, K6 CO 3 Understand the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms. K2, K5 CO 4 Apply classical sorting, searching, optimization and graph algorithms.

SEM V	**Data Analytics**	**KCS-051**	CO 1 Describe the life cycle phases of Data Analytics through discovery, planning and building. K1,K2 CO 2 Understand and apply Data Analysis Techniques. K2, K3 CO 3 Implement various Data streams. K3 CO 4 Understand item sets, Clustering, frame works & Visualizations. K2 CO 5
	Web Designing	**KCS-052**	CO 1 Understand principle of Web page design and about types of websites K3, K4 CO 2 Visualize and Recognize the basic concept of HTML and application in web designing. K1, K2 CO 3 Recognize and apply the elements of Creating Style Sheet (CSS). K2, K4 CO 4 Understand the basic concept of Java Script and its application.
	Computer Graphics	**KCS-053**	CO 1 Understand the graphics hardware used in field of computer graphics. K2 CO 2 Understand the concept of graphics primitives such as lines and circle based on different algorithms. K2, K4 CO 3 Apply the 2D graphics transformations, composite transformation and Clipping concepts. K4 CO 4 Apply the concepts of and techniques used in 3D computer graphics, including viewing

Object Oriented System Design	**KCS-054**	CO 1 Understand the application development and analyze the insights of object oriented programming to implement application K2, K4 CO 2 Understand, analyze and apply the role of overall modeling concepts (i.e. System, structural) K2, K3 CO 3 Understand, analyze and apply oops concepts (i.e. abstraction, inheritance) K2, K3, K4 CO 4 Understand the basic concepts of C++ to implement the object oriented concepts
Machine Learning Techniques	**KCS-055**	CO 1 To understand the need for machine learning for various problem solving K1 , K2 CO 2 To understand a wide variety of learning algorithms and how to evaluate models generated from data K1 , K3 CO 3 To understand the latest trends in machine learning K2 , K3 CO 4 To design appropriate machine learning algorithms and apply the algorithms to a real-world problems K4 , K6
Application of Soft Computing	**KCS-056**	CO 1 Recognize the feasibility of applying a soft computing methodology for a particular problem K2, K4 CO 2 Understand the concepts and techniques of soft computing and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems. K2,K4, K6 CO 3 Apply neural networks to pattern classification and regression problems and compare solutions by various soft computing

Augmented & Virtual Reality	**KCS-057**	CO 1 To make students know the basic concept and understand the framework of virtual reality. K1 , K2 CO 2 To understand principles and multidisciplinary features of virtual reality and apply it in developing applications. K2 , K4 CO 3 To know the technology for multimodal user interaction and perception VR, in particular the visual, audial and haptic interface and behavior. K2 , K3 CO 4 To understand and apply technology for managing large scale VR environment in real time.
Human Computer Interface	**KCS-058**	Understand and analyze the common methods in the user-centered design process and the appropriateness of individual methods for a given problem. K2, K4 CO 2 Apply , adapt and extend classic design standards, guidelines, and patterns. K3, K5 CO 3 Employ selected design methods and evaluation methods at a basic level of competence. K4, K5 CO 4 Build prototypes at varying levels of fidelity, from paper prototypes to functional, interactive prototypes. K4, K5

Software Engineering	**KCS 601**	CO 1 Explain various software characteristics and analyze different software Development Models. K1, K2 CO 2 Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards. K1, K2 CO 3 Compare and contrast various methods for software design K2, K3 CO 4 Formulate testing strategy for software systems, employ techniques such as unit testing, Test
Web Technology	**KCS 602**	CO 1 Explain web development Strategies and Protocols governing Web. K1, K2 CO 2 Develop Java programs for window/web-based applications. K2, K3 CO 3 Design web pages using HTML, XML, CSS and JavaScript. K2, K3 CO 4 Creation of client-server environment using socket programming K1, K2, CO 5 Building enterprise level applications and

	Computer Networks	**KCS 603**	CO1 Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission K1,K2 CO2 Apply channel allocation, framing, error and flow control techniques. K3 CO3 Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism. K2,K3 CO4 Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism. K2,K3 CO5
SEM VI	**Big Data**	**KCS-061**	CO 1 Demonstrate knowledge of Big Data Analytics concepts and its applications in business. K1,K2 CO 2 Demonstrate functions and components of Map Reduce Framework and HDFS. K1,K2 CO 3 Discuss Data Management concepts in NoSQL environment. K6 CO 4 Explain process of developing Map Reduce based distributed processing applications.
	Image Processing	**KCS-062**	CO 1 Explain the basic concepts of two-dimensional signal acquisition, sampling, quantization and color model. K1, K2 CO 2 Apply image processing techniques for image enhancement in both the spatial and frequency domains. K2, K3 CO 3 Apply and compare image restoration techniques in both spatial and frequency domain. K2, K3 CO 4 Compare edge based and region based

	Real Time Systems	**KCS-063**	CO 1 illustrate the need and the challenges in the design of hard and soft real time systems. K3 CO 2 Compare different scheduling algorithms and the schedulable criteria. K4 CO 3 Discuss resource sharing methods in real time environment. K3 CO 4 Compare and contrast different real time communication and medium access control
	Data Compression	**KCS-064**	Describe the evolution and fundamental concepts of Data Compression and Coding Techniques. K1, K2 CO 2 Apply and compare different static coding techniques (Huffman & Arithmetic coding) for text compression. K2, K3 CO 3 Apply and compare different dynamic coding techniques (Dictionary Technique) for text compression. K2, K3 CO 4 Evaluate the performance of predictive coding technique for Image Compression. K2, K3
	Distributed System	**RCS701**	➢ To provide hardware and software issues in modern distributed systems ➢ To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems. ➢ To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.
	Artificial Intelligence	**RCS702**	➢ Demonstrate fundamental understanding of artificial intelligence (AI) and expert systems. ➢ Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning. ➢ Demonstrate proficiency in applying scientific method to models of machine learning. Discuss the awareness of ANN and different optimizations techniques ➢ Apply basic principles of AI in solutions that

SEM VII	**Soft computing**	**RCS071**	➢ Comprehend the fuzzy logic and the concept of fuzziness involved in various systems and fuzzy set theory. ➢ Understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic ➢ To understand the fundamental theory and concepts of neural networks, Identify different neural network architectures, algorithms, applications
	Cloud Computing	**RCS075**	technologies, strengths and limitations of cloud computing. ➢ Learn the key and enabling technologies that help in the development of cloud. ➢ Develop the ability to understand and use the architecture of compute and storage cloud, service and delivery models. ➢ Explain the core issues of cloud computing such as resource management
SEM VIII	**Image Processing**	**RCS082**	➢ Describe different image representation, their mathematical representation and different their data structures used. ➢ Classify different segmentation algorithm for given input. ➢ Create a 3D object from given set of images.
	Machine Learning	**ROE083**	➢ To understand the need for machine learning for various problem solving ➢ To study the various supervised, semi-supervised and unsupervised learning algorithms in Machine learning ➢ To understand the latest trends in machine
	Data Compression	**RCS087**	concepts of Data Compression and Coding techniques ➢ Apply and compare different static coding techniques (Huffman & Arithmetic coding) for text Compression. ➢ Apply and compare different dynamic coding techniques (Dictionary Technique) for text compression. ➢ Evaluate the performance of predictive coding

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2020-21)

BTECH ELECTRONICS & COMMUNICATION ENGGINERING

PROGRAMME OUTCOME

1. Engineering knowledge:
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis:
Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions:
Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems:
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage:
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society:
Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability:
Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics:
Apply ethical principles and commit to professional ethics and responsibilities And norms of the engineering practice.
9. Individual and team work:
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. Communication:

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	KAS101T	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes. 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent Streams.

ENGINEERING CHEMISTRY	**KAS101T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.
ENGINEERING MATHEMATICS-I	**KAS103T**	CO 1. Remember the concept of matrices and apply for solving linear simultaneous equations. CO 2. Understand the concept of limit continuity and differentiability and apply in the study of Rolle,s, Lagrange,s and Cauchy mean value theorem and Leibnitz theorems . CO 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. CO 4. Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of gravity. CO 5. Remember the concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and volume integrals.
BASIC ELECTRICAL ENGINEERING	**KEE101T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. 5. Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC101T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of Operational amplifier 4. Understand the concept of measurement instrument. 5. Understand the working principle of different type
PROGRAMMING FOR PROBLEM SOLVING	**KCS101T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language)

SEM I	**FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS**	**KME101T**	CO1. Understand the concept of stress and strain, factor of safety, beams. CO2. Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3. Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4. Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system. CO5.Understand concept of mechatronics with their advantages, scope and Industrial application, the different types of mechanical actuation system, the different types of hydraulic and pneumatic systems. CO6. Apply concepts of strength of material for safe design, refrigeration for calculation of COP, concepts of fluid mechanics in real life, concepts of measurements in production systems.
	ENGINEERING PHYSICS LAB	**KAS151P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil. 4. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.
	ENGINEERING CHEMISTRY LAB	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in

ENGINEERING CHEMISTRY LAB	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
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PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS151P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations
ENGLISH LANGUAGE LAB	**KAS154P**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc.
ENGINEERING GRAPHICS & DESIGN LAB	**KCE151P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design.
MECHANICAL WORKSHOP LAB	**KWS151P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop.
ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC101**	CO1 Understand the evolution and various approaches of AI CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks.

	EMERGING TECHNOLOGY FOR ENGINEERING	**KMC102**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones.
	SOFT SKILL I	**KNC101**	correct usage of grammar. Unit 2- Students will apply the fundamental inputs of communication skills in making speech delivery, individual conference, and group communication. Unit 3-Students will evaluate the impact of interpersonal Communication on their performance as a professional and in obtaining professional
	ENGINEERING PHYSICS	**KAS201T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes
	ENGINEERING CHEMISTRY	**KAS202T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water.
	ENGINEERING MATHEMATICS-II	**KAS203T**	CO 1 Understand the concept of differentiation and apply for solving differential equations. CO 2 Remember the concept of definite integral and apply for evaluating surface areas and volumes. K1, K3 & K5 CO 3 Understand the concept of convergence of sequence and series. Also evaluate Fourier series. CO 4 Illustrate the working methods of complex
	BASIC ELECTRICAL ENGINEERING	**KEE201T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer
	EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC201T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of perational amplifier 4. Understand the concept of measurement instrument. 5. Understand the working principle of different type
	PROGRAMMING FOR PROBLEM SOLVING	**KCS201T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language). 3. To implement conditional branching, iteration and recursion.

	FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME201T**	CO1 Understand the concept of stress and strain, factor of safety, beams. CO2 Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3 Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4 Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration,
	ENGINEERING PHYSICS LAB	**KAS251P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil
	ENGINEERING CHEMISTRY LAB	**KAS252P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity. 3. Measure conductance of solution, chloride and iron content in water, hardness of water.
SEM II	**BASIC ELECTRICAL ENGINEERING LAB**	**KEE251P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS251P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
	ENGLISH LANGUAGE LAB	**KAS254P**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc.

	ENGINEERING GRAPHICS & DESIGN LAB	**KCE251P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design.
	MECHANICAL WORKSHOP LAB	**KWS251P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop.
	ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC201**	CO1 Understand the evolution and various approaches of AI. CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks.
	EMERGING TECHNOLOGY FOR ENGINEERING	**KMC202**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones.
	SOFT SKILL II	**KNC201**	effective LSRW skills in English. Unit 2- Students will evaluate the importance of conversation in their personal and professional domain and apply it for extending their professional frontiers. Unit 3- Students will learn to apply motivation skills
SEM III	**Electronic Devices**	**KEC301**	1. Understand the principles of semiconductor Physics. 2. Understand and utilize the mathematical models of semiconductor junctions. 3. Understand carrier transport in semiconductors
	Digital System Design	**KEC302**	1. Design and analyze combinational logic circuits. 2. Design and analyze modular combinational circuits with MUX / DEMUX, Decoder & Encoder 3. Design & analyze synchronous sequential logic circuits
	Network Analysis and Synthesis	**KEC303**	and mesh analysis. 2. Appreciate electrical network theorems. 3. Apply Laplace transform for steady state and transient analysis.

SEM IV	**Communication Engineering**	**KEC401**	1. Analyze and compare different analog modulation schemes for their efficiency and bandwidth. 2. Analyze the behavior of a communication system in presence of noise. 3. Investigate pulsed modulation system and analyze
	Analog Circuits	**KEC402**	1. Understand the characteristics of diodes and transistors. 2. Design and analyze various rectifier and amplifier circuits. 3. Design sinusoidal and non-sinusoidal oscillators.
	Signal System	**KEC403**	2. Analyze linear shift-invariant (LSI) systems. 3. Represent continuous and discrete systems in time and frequency domain using Fourier series and transform. 4. Analyze discrete time signals in z-domain. 5. Study sampling and reconstruction of a signal.
	Integrated Circuits	**KEC-501**	1. Explain complete internal analysis of Op-Amp 741-IC. 2. Examine and design Op-Amp based circuits and basic components of ICs such as various types of filter. 3. Implement the concept of Op-Amp to design Op-
	Microprocessor & Microcontroller	**KEC-502**	1. Demonstrate the basic architecture of 8085. 2. Illustrate the programming model of microprocessors & write program using 8085 microprocessor. 3. Demonstrate the basics of 8086 Microprocessor and interface different external Peripheral Devices like timer, USART etc. with Microprocessor (8085/8086).
	Digital Signal Processing	**KEC-503**	1. Design and describe different types of realizations of digital systems (IIR and FIR) and their utilities. 2. Select design parameters of analog IIR digital filters (Butterworth and Chebyshev filters) and implement various methods such as impulse invariant transformation and bilinear transformation of conversion of analog to digital filters. 3. Design FIR filter using various types of window functions.
	Computer Architecture and Organization	**KEC-051**	1. Discuss about the basic concepts of system design methodology and processor level design. 2. Explain the basics of processor and basic formats of data representation. 3. Perform fixed and floating point arithmetic
	Industrial Electronics	**KEC-052**	1. Describe the characteristics, operation of power switching devices and identify their ratings and applications. 2. Recognize the requirement of SCR Protection and describe the Functioning of SCR.

SEM VI	**VLSI Technology**	**KEC-053**	1. Interpret the basics of crystal growth, wafer preparation and wafer cleaning. 2. Evaluate the process of Epitaxy and oxidation. 3. Differentiate the lithography, etching and deposition process.
	Advance Digital Design using Verilog	**KEC-054**	1. Describe mixed logic circuits and their implementation. 2. Implement combinational circuits using mixed logic and Verilog. 3. Design sequential circuits using mixed logic and
	Electronics Switching	**KEC-055**	1. Describe the fundamentals of circuit switching and distinguish complex telephone systems. 2. Differentiate the fundamentals of Space division switching and time division switching. 3. Design, develop and evaluate the telecom traffic to meet defined specifications and needs.
	Advance Semiconductor Device	**KEC-056**	1. Explain the behavior of BJT and MOSFET in DC biasing and as CE amplifier circuit. 2. Describe the Tunnel diode and IMPATT diode. 3. Explain the basics of Light-Emitting Diode (LED) and evaluate the performance of Photoconductor and photodiode. 4. Distinguish the performance of Photoconductor,
	Electronics Measurement & Instrumentation	**KEC-057**	1. Classify the Instrumentation and Measurement system and various measurement errors. 2. Analyze and design voltmeter circuits, AC electronic voltmeter, digital frequency meter and current measurement with electronic instruments. 3. Evaluate various resistance and impedance measuring methods using Bridges and Q-meter.
	Optical Communication	**KEC-058**	of optical communication. 2. Describe the signal losses with their computation and dispersion mechanism occurring inside the optical fiber cable. 3. Differentiate the optical sources used in optical communication with their comparative study. 4. Identify different optical components on receiver side; assemble them to solve real world
	Digital Communication	**KEC-601**	1. To formulate basic statistics involved in communication theory. 2. To demonstrate the concepts involved in digital communication. 3. To explain the concepts of digital modulation
	Control System	**KEC-602**	1. Describe the basics of control systems along with different types of feedback and its effect. Additionally they will also be able to explain the techniques such as block diagrams reduction, signal flow graph and modelling of various physical systems along with modelling of DC servomotor. 2. Explain the concept of state variables for the representation of LTI system.

SEM VI	**Antenna and Wave Propagation**	**KEC-603**	1. Identify different coordinate systems and their applications in electromagnetic field theory to establish a relation between any two systems using the vector calculus. 2. Explain the concept of static electric field, current and properties of conductors.
	Microcontroller & Embedded System Design	**KEC-061**	1. Explain the advance concept of 8051 architectures and AVR family architecture and compare them for different applications. 2. To demonstrate the basics of MSP430x5x Microcontroller 3. To execute the I/O interfacing and peripheral devices associated with Microcontroller SoC (system on chip).
	Satellite Communication	**KEC-062**	1. Define and list the benefits of satellite communication. 2. Demonstrate orbital mechanics principles of satellite communication systems and solve problems related to it. 3. Describe a satellite link and identify ways to
	Data Communication Networks	**KEC-063**	1. Identify the issues and challenges in the architecture of a network. 2. Analyze the services and features of various protocol layers in data layer. 3. Demonstrate the knowledge of multiple access to design a access technique for a
	Analog Signal Processing	**KEC-064**	1. Describe and apply fundamentals of signal processing in analog domain and its associated concepts like OTA and current conveyor. 2. Introduction of filter and its designing parameters 3. Solve problems and design higher order filters like Butterworth and Chebyshev. 4. Understand and explain the reasons for delay in filter designing and its procedure to equalize.
	Random Variables & Stochastic Process	**KEC-065**	of Probability. 2. Students will be able to demonstrate the concept of Random Variables. 3. Students will be able to analyze Multiple Random Variables.
	Data Communication Networks	**REC701**	CO1 Identify the issues and challenges in the architecture of a network. CO2 Understand the ISO/OSI seven layers in a network.
	VLSI Design	**REC702**	CO1 Model the behaviour of a MOS Transistor CO2 Design combinational and sequential circuits using CMOS gates CO3 Identify the sources of power dissipation in a

	Optical Network	**REC070**	CO1 Familiarize with multiplexing techniques, second generation optical networks, The optical layer, optical packet switching. CO2 Understand the concept of Principles of operation, Conservation of energy, Isolators and circulators: Principles of operation. CO3 Understand the basics of Multiplexing, SONET/SDH layers, SONET Frame structure, SONET/SDH physical layer, Elements of a SONET/SDH infrastructure. CO4 To gain knowledge of Routing and wavelength
	Information Theory & Coding	**REC071**	CO1 Model the Entropy, Joint Entropy and Conditional Entropy, Relative Entropy and Mutual Information, Relationship Between Entropy and Mutual Information CO2 Design Data Compression, Examples of Codes, Kraft Inequality, Optimal Codes, Bounds on the Optimal Code Length CO3 Identify the Examples of Channel Capacity, Symmetric Channels, Properties of Channel Capacity, Preview of the Channel Coding Theorem. CO4 Analyse Introduction to block codes, Single-parity-
	Digital Image Processing	**REC072**	CO1 Understand the need for image transforms and their properties CO2 Choose appropriate technique for image enhancement both in spatial and frequency Domains. CO3 Identify causes for image degradation and apply
SEM VII	**Advance Programming in Engineering**	**REC073**	CO1 Understand the fundamentals of Matlab programming as well as understand and apply advance level programming techniques for solving problems using numerical methods. CO2 Learn, apply, and investigate Matlab applications in advance communication systems. CO3 Apply and investigate stability of systems and processes using time domain and frequency domain stability criterions like Routh-Hurwitz, State-space representation,

	Optical Communication	**REC075**	CO1 Familiarize with basic concepts and theory of Optical Communication CO2 Demonstrate OPCOMM components, assemble them and solve problems on Optical Communication system CO3 Able to design, implements, analyse and maintains optical communication system CO4 Gain knowledge of different source of light as
	Filter Design	**REC076**	CO1 Choose an appropriate transform for the given signal. CO2 Choose appropriate decimation and interpolation factors for high performance filters.
	Applied Fuzzy Electronic Systems	**REC077**	CO1 Understand the Operations of Fuzzy Sets, Properties of Fuzzy Sets, Geometric Interpretations of Fuzzy Sets, Possibility Theory. CO2 Design Fuzzy Mapping Rule, Fuzzy Implication Rule, Fuzzy Rule Based Models for Function Approximations, Theoretical Foundation of Fuzzy Mapping Rules, Types of Fuzzy Rule Based Models. CO3 Realization of Fuzzy Sets and their properties; Cardinality of Classical Relations and their properties. CO4 Aware Principle of Vertex Method, DSW Algorithm,
	Computerized Process Control	**REC078**	Understand the Role of computers in process control, Elements of a computer aided Process control System, Classification of a Computer. CO2 Design Phase Locked Local Loop, Mixers. Time Division Multiplexed System – TDM/PAM system CO3 Realize Process model, Physical model, Control Model. Modelling Procedure. CO4 Formulate of Cascade Control, Predictive control,
	Electronic Switching	**REC080**	CO1 Describe and apply fundamentals of telecommunication systems and associated technologies. CO2 Solve problems and design simple systems related to tele-traffic and trunking efficiency. CO3 Understand and explain the reasons for switching, and the relative merits of the possible switching

SEM VIII	**Analytical Instrumentation**	**REC081**	CO1 Understand the Electromagnetic Radiation, Laws relating to absorption radiation, Absorption Instruments, Ultraviolet and visible absorption spectroscopy, Calorimeters. CO2 Design basic components of IR Spectrophotometers, Type of Infrared Spectrophotometers, Sample Handling Techniques. CO3 Learnprinciple, constructional details of flame photometers, types of flame photometers, types of flame photometers. CO4 Be aware of Basic Mass Spectrometer, Principle of
	Advanced Display Technologies & Systems	**REC082**	CO1 Understand Anatomy of Eye, Light Detection and Sensitivity, Spatial Vision and Pattern Perception, Binocular Vision and Depth Perception. CO2 Understand Photolithography for Thin Film LCD, Wet Etching, Dry Etching; Flexible Displays. CO3 Understand Thin Film Electroluminescent Displays, AC Powder Electroluminescent Displays; Organic Electroluminescent Displays: OLEDs, Active Matrix for OLED Displays CO4 Be aware ofColorant Transposition Displays, MEMs
	Satellite & RADAR systems	**REC083**	CO1 Understand the orbital and functional principles of satellite communication systems CO2 Architect, interpret, and select appropriate technologies for implementation of specified satellite communication systems CO3 Analyse and evaluate a satellite link and suggest enhancements to improve the link performance. CO4 Select an appropriate modulation, multiplexing, coding and multiple access schemes for a given
	Wireless & Mobile Communication	**REC085**	CO1 Familiarize with various generations of mobile communications. CO2 Understand the concept of cellular communication. CO3 Understand the basics of wireless communication. CO4 Understand GSM mobile communication standard, its architecture, logical channels, advantages and limitations.

	Voice Over IP	**REC086**	CO1 Understand the characteristics of the Call signalling systems. CO2 Design SIP Architecture. CO3 Model and estimate media gateways. CO4 Understand the network synchronization and
	Speech Processing	**REC087**	CO1 Understand the mechanism of speech production & acoustic phonetics, the acoustic theory of speech production, lossless tube models. CO2 Understand time dependent processing of speech, short time energy and average magnitude, short time average zero crossing rate. CO3 Design of filter banks, implementation of filter bank summation method using FFT. CO4 Evaluate homomorphic system for convolution, complex cepstrum of speech, pitch detection using
	Micro and Smart Systems	**REC088**	Microsystems versus MEMS, Why micro fabrication. CO2 Design Silicon capacitive accelerometer, piezo-resistive pressure sensor, conductometric gas sensor. CO3 Realizesilicon as a material for micro machining, thin film deposition, lithography, etching, silicon micromachining. CO4 Understand bar, beam, energy methods for elastic bodies, heterogeneous layered beams, bimorph effect, residual stress and stress gradients, poisson effect and the anticlastic curvature

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2020-21)

BTECH ELECTRICAL ENGGINERING

PROGRAMME OUTCOME

By the culmination of this program, the graduate acquires the ability to

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	**KAS101T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes. 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent
	ENGINEERING CHEMISTRY	**KAS101T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.

ENGINEERING MATHEMATICS-I	**KAS103T**	CO 1. Remember the concept of matrices and apply for solving linear simultaneous equations. CO 2. Understand the concept of limit continuity and differentiability and apply in the study of Rolle,s, Lagrange,s and Cauchy mean value theorem and Leibnitz theorems . CO 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. CO 4. Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of
BASIC ELECTRICAL ENGINEERING	**KEE101T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC101T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of Operational amplifier 4. Understand the concept of measurement instrument.
PROGRAMMING FOR PROBLEM SOLVING	**KCS101T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language) 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME101T**	CO1. Understand the concept of stress and strain, factor of safety, beams. CO2. Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3. Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4. Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system.

SEM I	**ENGINEERING PHYSICS LAB**	**KAS151P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
	ENGINEERING CHEMISTRY LAB	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase
	ENGINEERING CHEMISTRY LAB	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS151P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
	ENGLISH LANGUAGE LAB	**KAS154P**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms

	ENGINEERING GRAPHICS & DESIGN LAB	**KCE151P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design.
	MECHANICAL WORKSHOP LAB	**KWS151P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop.
	ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC101**	CO1 Understand the evolution and various approaches of AI CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks.
	EMERGING TECHNOLOGY FOR ENGINEERING	**KMC102**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones.
	SOFT SKILL I	**KNC101**	correct usage of grammar. Unit 2- Students will apply the fundamental inputs of communication skills in making speech delivery, individual conference, and group communication. Unit 3-Students will evaluate the impact of interpersonal Communication on their performance as a professional and in obtaining professional excellence at the workplace. Unit 4-Skills and techniques of persuasion and negotiation would enhance the level of students at multifarious administrative and managerial
	ENGINEERING PHYSICS	**KAS201T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory.

ENGINEERING CHEMISTRY	**KAS202T**	2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.
ENGINEERING MATHEMATICS-II	**KAS203T**	CO 1 Understand the concept of differentiation and apply for solving differential equations. CO 2 Remember the concept of definite integral and apply for evaluating surface areas and volumes. K1, K3 & K5 CO 3 Understand the concept of convergence of sequence and series. Also evaluate Fourier series. CO 4 Illustrate the working methods of complex functions and apply for finding analytic functions. CO 5 Apply the concept of complex functions for
BASIC ELECTRICAL ENGINEERING	**KEE201T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction
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SEM II	**ENGINEERING PHYSICS LAB**	**KAS251P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
	ENGINEERING CHEMISTRY LAB	**KAS252P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity. 3. Measure conductance of solution, chloride and iron content in water, hardness of water.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE251P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials.
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS251P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in
	ENGLISH LANGUAGE LAB	**KAS254P**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/ administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct

ENGINEERING GRAPHICS & DESIGN LAB	**KCE251P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design.
MECHANICAL WORKSHOP LAB	**KWS251P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop.
ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC201**	CO1 Understand the evolution and various approaches of AI. CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks.
EMERGING TECHNOLOGY FOR ENGINEERING	**KMC202**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones.
SOFT SKILL II	**KNC201**	effective LSRW skills in English. Unit 2- Students will evaluate the importance of conversation in their personal and professional domain and apply it for extending their professional frontiers. Unit 3- Students will learn to apply motivation skills for their individual and professional excellence. Unit 4- Students will utilize their teamwork and their interpersonal communication skills to survive

SEM III	**Electromagnetic Field Theory**	**KEE301**	CO 1 Apply different coordinate systems and their application in electromagnetic field theory, establish a relation between any two systems and also understand the vector calculus. K3 CO2 Understand the concept of static electric field. Understand the concept of current and properties of conductors. Establish boundary conditions and to calculate capacitances of different types of capacitors K4 CO3 Understand the concept of static magnetic field, magnetic scalar and vector potential K4 CO4 Understand the forces due to magnetic field,
	Electrical Measurements & Instrumentation	**KEE302**	CO 1 Evaluate errors in measurement as well as identify and use different types of instruments for the measurement of voltage, current, power and energy. K1 CO2 Display the knowledge of measurement of electrical quantities resistance, inductance and capacitance with the help of bridges. K2 CO3 Demonstrate the working of instrument transformers as well as calculate the errors in current and potential transformers. K2 CO4 Manifest the working of electronic instruments like voltmeter, multi-meter,
	Basic Signals & Systems	**KEE303**	systems and can perform mathematical operations on them. K2 CO2 Analyze the response of LTI system to Fourier series and Fourier transform and to evaluate their applications to network analysis. K4 CO3 Analyze the properties of continuous time signals and system using Laplace transform and determine the response of linear system to known inputs. K4
	Digital Electronics	**KEE401**	CO 1 Apply concepts of Digital Binary System and implementation of Gates. K3 CO2 Analyze and design of Combinational logic circuits. K4 CO3 Analyze and design of Sequential logic circuits

SEM IV	**Electrical Machines-I**	**KEE402**	CO 1 Analyze the various principles & concepts involved in Electromechanical Energy conversion. K4 CO2 Demonstrate the constructional details of DC machines as well as transformers, and principle of operation of brushless DC motor, Stepper and DC Servo motors. K2 CO3 Evaluate the performance and characteristics of DC Machine as motor and as well as
	Networks Analysis & Synthesis	**KEE403**	nodal and mesh methods of circuit analysis and simplify the network using Graph Theory approach. K3 CO2 Analyze the AC and DC circuits using Kirchhoff's law and Network simplification theorems. K4 CO3 Analyze steady-state responses and transient response of DC and AC circuits using classical and Laplace transform methods. K4 CO4 Demonstrate the concept of complex
	Power System - I	**KEE501**	CO1 Describe the working principle and basic components of conventional power plants as well as the other aspects of power generation. K2 CO2 Recognize elements of power system and their functions, as well as compare the different types of supply systems. Illustrate different types of conductors, transmission lines and various performance parameters of transmission line for short, medium and long transmission line. K4 CO3 Calculate sag and tension in overhead lines with and without wind and ice loading. Classify different type of insulators, determine potential distribution over a string of insulator, string efficiency and its improvement. K4 CO4 Compute the inductance and capacitance of single

SEM V	**Control System**	**KEE502**	CO 1 Obtain transfer functions to predict the correct operation of open loop and closed loop control systems and identify the basic elements, structures and the characteristics of feedback control systems. K3 CO 2 Measure and evaluate the performance of basic control systems in time domain. Design specification for different control action. K4 CO 3 Analyze the stability of linear time-invariant systems in time domain using Routh- Hurwitz criterion and root locus technique. K4 CO 4 Determine the stability of linear time-invariant systems in frequency domain using Nyquist criterion and Bode plot. K4
	Electrical Machines-II	**KEE503**	CO 1 Demonstrate the constructional details and principle of operation of three phase Induction and Synchronous Machines. K3 CO 2 Analyze the performance of the three phase Induction and Synchronous Machines using the phasor diagrams and equivalent circuits. K4 CO 3 Select appropriate three phase AC machine for any application and appraise its significance. K4 CO 4 Start and observe the various characteristics of three phase Induction & Synchronous Machines K4
	Robotics	**KEE051**	CO1 Learn the basic terminology used in robotics. K2 CO2 Conceptualize 3-D translation & orientation of robot arm kinematics. K3 CO3 Understand different robotic actuators and

Sensors and Transducers	**KEE052**	CO 1 Understand the working of commonly used sensors in industry for measurement of displacement, force and pressure. K3 CO2 Recognize the working of commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level. K3
Industrial Automation and Control	**KEE053**	CO1 Understand the concept of automation, its terminology and basic communication protocol. K2 CO2 Apply Relay logic for automation. K3 CO3 Learn about PLC, its operation and application in automation. K3
Electrical Standards and Engineering Practices	**KEE054**	CO1 Interpret different National & International Electrical Standards in practice K2 CO2 Understand Indian standards for cables, lighting and motors. K3 CO3 Understand Indian standards of transformers,
Optimization Techniques	**KEE055**	CO 1 Understand the importance of optimization techniques in engineering applications K2 CO2 Learn optimization methods for solving linear programming problems K3 CO3 Learn optimization methods for solving
Neural Networks & Fuzzy System	**KEE056**	CO 1 Apply the concepts of feed forward neural networks and their learning techniques. K3 CO2 Comprehend the architecture, develop algorithms and apply the concepts of back propagation networks. K5 CO3 Differentiate between the fuzzy and the crisp sets, apply the concepts of fuzziness and the fuzzy set theory. K4 CO4 Select the membership functions, write rules

	Digital Signal Processing	**KEE057**	CO 1 Represent discrete sequence and LTI systems, frequency domain of discrete sequence. Compute Fourier transform. Draw structure of systems based on System type-IIR & FIR Systems. K2 CO2 Describe sampling of signal and its reconstruction, processing of continuous time and discrete time signals. Sampling rate variation and application of multirate signal processing. Sampling effect in A/D and D/A conversion. K3 CO3 Evaluate the response of LTI system and rational system function. Drive linear phase systems. Compute discrete Fourier transform (DFT) and calculate linear and circular convolution. K5 CO4 Design IIR & FIR filters with the desired specification with the help of impulse
	Analog & Digital Communication	**KEE058**	communication system. K2 CO2 Comprehend the Frequency & Phase modulation. K2 CO3 Realize the Pulse Modulation Techniques. K2 CO4 Get the Digital Modulation Techniques and
	Power System-II	**KEE601**	CO1 Identify power system components on one line diagram of power system and its representation including the behaviour of the constituent components and sub systems and Analyse a network under both balanced and unbalanced fault conditions and design the rating of circuit breakers. K4 CO2 Perform load flow analysis of an electrical power network and interpret the results of the analysis. K4 CO3 Describe the concept of travelling waves in transmission lines and use the travelling wave theory to determine the over voltage caused by surge propagation in transmission networks. K4 CO4

	Microprocessor and Microcontroller	**KEE602**	CO 1 Demonstrate the basic architecture of 8085 & 8086 microprocessors K2 CO2 Illustrate the programming model of microprocessors & write program using 8085 microprocessor K3 CO3 Interface different external peripheral devices with 8085 microprocessor K3 CO4 Comprehend the architecture of 8051 microcontroller K2
	Power Electronics	**KEE603**	CO 1 Demonstrate the characteristics as well as the operation of BJT, MOSFET, IGBT, SCR, TRIAC and GTO and identify their use in the power switching applications. K4 CO2 Comprehend the non-isolated DC-DC converters and apply their use in different Power electronics applications. K3 CO3 Analyze the phase controlled rectifiers and evaluate their performance parameters. K5 CO4 Apprehend the working of single-phase ac voltage controllers, cyclo-converters and their various applications.
SEM VI	**Special Electrical Machines**	**KEE 061**	CO 1 Describe the working principle, Constructional Features of different types of electrical machines including the fractional kilowatt machines. K2 CO2 Analyse torque- speed characteristics of different electrical machines and interpret their performance and identify the suitable machine for an operation. K4 CO3 Study different types of control techniques for a machine and identify the best control strategy based upon different constraints. K4

	Electrical Machine Design	**KEE 062**	CO 1 Classify insulating materials for electrical machines and calculate mmf and magnetizing current. K5 CO2 Design the core, yoke, windings and the cooling system of a transformer. K6 CO3 Illustrate the core and armature design of DC and 3-phase synchronous machine. Design design of three phase induction motors, field system of DC machine and synchronous machines. K6
	Digital Control System	**KEE 063**	CO 1 Represent discrete time systems under the form of z-domain transfer functions and state-space models. K3 CO 2 Obtain the model of discrete-time systems by pulse transfer function. K4 CO 3 Analyze stability, transient response and steady state behaviour of linear discretetime systems, analytically and numerically using tools such as MATLAB and Simulink K4
	Electrical and Hybrid Vehicles	**KEE 064**	Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources K3 CO2 Design and develop basic schemes of electric vehicles and hybrid electric vehicles. K6 CO3 Choose proper energy storage systems for vehicle applications K5 CO4 Identify various communication protocols and
	Understanding the Human Being Comprehensibly -Human Aspiration and its Fulfilments-Understanding the Human Being Comprehensibly -Human Aspiration and its Fulfilments	**ROE-074**	CO1 To help the students having the clarity about human aspirations, goal, activities and purpose of life K1 CO2 To felicitate the competence to understand the harmony in nature/existence and participation of human being in the nature/existence K2

SEM VII	**Utilization of Electrical Energy and Electric Traction**	**REE-071**	CO1 Understand the power electronics technology in efficient utilization of electrical power. K2 CO2 Apply the power electronics technology in efficient utilization of electrical power K3 CO3 Analyze the effective utilization of power electronics technology in electrical traction. K4
	Energy Efficiency and conservation	**REE-076**	CO1 Students will be able to apply the knowledge of the subject to calculate the efficiency if various thermal utilities. K5 CO2 Students will be able to design suitable energy monitoring system to analyse and optimize the energy consumption in an organization. K6 CO3 Students will be able to improve the thermal efficiency by designing suitable systems for heat recovery and cogeneration. K3 CO4 Students will be able to use energy audit methods to identify the areas deserving tighter control to save energy expenditure. K3
	Communication system	**REN-071**	CO1 Apply the knowledge of theory of communication and explain the conventional digital communication system. K3 CO2 Apply the knowledge of signals and evaluate the performance of digital communication system in presence of noise. K3 CO3 Apply the knowledge of digital electronics and describe the error control codes like block code, cyclic codes etc. K3 CO4 Evaluate the results to provide valid

	Power System & Protection	**REE-721**	breakers used in power system. K1 CO2 Students will be able to identify different protection zones and protection schemes in power system. K2 CO3 Students will be able to differentiate various including distance and differential protection scheme. K4 CO4 Students will be able to explain the working principle of static relays . K5 CO5 Students will be able to summarize the protection schemes for generator, transformer, motor, feeder and
SEM VIII	**Renewable Energy Resources**	**ROE-086**	CO1 Remember the environmental aspects of non-conventional energy resources . K1 CO2 Understand the need of renewable energy resources , historical and latest developments. K2 CO3 Evaluate the use of solar energy and the various components used in the energy production with respect to applications like heating,cooling,desalination, power generation , drying ,cooking etc. K5 CO4 Analyze the need of wind energy and various components used in energy generation and know the classifications. K4
	Introduction to Power Quality and FACTS	**REE081**	CO1 Understand the standards of power quality parameters, the sources of the power quality problems and the definitions of power quality parameters K2 CO2 Analyse computational methods to calculate active and reactive power and FFT for calculation of harmonic components. K4 CO3 Understand the power quality monitoring

	. EHVAC & DC Transmission	**REE085**	HVDC transmission. and identify the electrical requirements for HVDC lines K2 CO2 To apply the components used in AC to DC conversion K3 CO3 Understand the operation of HVDC conversion technology and fundamental requirements of HVDC transmission line design K2 CO4 Students will understand the effects of corona like Audible

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2020-

BTECH ELECTRONICS & COMMUNICATION ENGGINERING

PROGRAMME OUTCOME

Engineering Graduates will be able to:

1. Engineering knowledge:
Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. Problem analysis:
Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. Design/development of solutions:
Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. Conduct investigations of complex problems:
Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. Modern tool usage:
Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. The engineer and society:
Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. Environment and sustainability:
Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. Ethics:
Apply ethical principles and commit to professional ethics and responsibilities And norms of the engineering practice.
9. Individual and team work:
Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	KAS101T	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes. 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent Streams.

ENGINEERING CHEMISTRY	**KAS101T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.
ENGINEERING MATHEMATICS-I	**KAS103T**	CO 1. Remember the concept of matrices and apply for solving linear simultaneous equations. CO 2. Understand the concept of limit continuity and differentiability and apply in the study of Rolle,s, Lagrange,s and Cauchy mean value theorem and Leibnitz theorems . CO 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. CO 4. Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of gravity. CO 5. Remember the concept of vector and apply for directional derivatives, tangent and normal planes. Also evaluate line, surface and
BASIC ELECTRICAL ENGINEERING	**KEE101T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. 5. Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC101T**	devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of Operational amplifier 4. Understand the concept of measurement instrument.

	PROGRAMMING FOR PROBLEM SOLVING	**KCS101T**	and logical problems. 2. To translate the algorithms to programs & execution (in C language) 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and
SEM I	**FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS**	**KME101T**	CO1. Understand the concept of stress and strain, factor of safety, beams. CO2. Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3. Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4. Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system. CO5.Understand concept of mechatronics with their advantages, scope and Industrial application, the different types of mechanical actuation system, the different types of hydraulic and pneumatic systems. CO6. Apply concepts of strength of material for safe design, refrigeration for calculation of COP, concepts of fluid mechanics in real life, concepts of measurements in production systems.
	ENGINEERING PHYSICS LAB	**KAS151P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil. 4. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.
	ENGINEERING CHEMISTRY LAB	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.

BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
ENGINEERING CHEMISTRY LAB	**KAS152P**	as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three
PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS151P**	draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
ENGLISH LANGUAGE LAB	**KAS154P**	basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking
ENGINEERING GRAPHICS & DESIGN LAB	**KCE151P**	engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design. 6. Analysis of Isometric views.
MECHANICAL WORKSHOP LAB	**KWS151P**	machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop. CO4 Perform operations in welding, moulding,

	ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC101**	approaches of AI CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks.
	EMERGING TECHNOLOGY FOR ENGINEERING	**KMC102**	things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones.
	SOFT SKILL I	**KNC101**	the correct usage of grammar. Unit 2- Students will apply the fundamental inputs of communication skills in making speech delivery, individual conference, and group communication. Unit 3-Students will evaluate the impact of interpersonal Communication on their
	ENGINEERING PHYSICS	**KAS201T**	problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes 3. To formulate and solve the engineering
	ENGINEERING CHEMISTRY	**KAS202T**	as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.
	ENGINEERING MATHEMATICS-II	**KAS203T**	and apply for solving differential equations. CO 2 Remember the concept of definite integral and apply for evaluating surface areas and volumes. K1, K3 & K5 CO 3 Understand the concept of convergence of sequence and series. Also evaluate Fourier series.
	BASIC ELECTRICAL ENGINEERING	**KEE201T**	theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency.

	EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC201T**	devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of perational amplifier 4. Understand the concept of measurement instrument.
	PROGRAMMING FOR PROBLEM SOLVING	**KCS201T**	and logical problems. 2. To translate the algorithms to programs & execution (in C language). 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and
	FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME201T**	strain, factor of safety, beams. CO2 Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3 Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4 Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and
	ENGINEERING PHYSICS LAB	**KAS251P**	by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
	ENGINEERING CHEMISTRY LAB	**KAS252P**	as surface tension, viscosity. 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
SEM II	**BASIC ELECTRICAL ENGINEERING LAB**	**KEE251P**	application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS251P**	draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in

	ENGLISH LANGUAGE LAB	**KAS254P**	basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking
	ENGINEERING GRAPHICS & DESIGN LAB	**KCE251P**	engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design. 6. Analysis of Isometric views.
	MECHANICAL WORKSHOP LAB	**KWS251P**	machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop. CO4 Perform operations in welding, moulding,
	ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC201**	approaches of AI. CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks.
	EMERGING TECHNOLOGY FOR ENGINEERING	**KMC202**	things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones.
	SOFT SKILL II	**KNC201**	with effective LSRW skills in English. Unit 2- Students will evaluate the importance of conversation in their personal and professional domain and apply it for extending their professional frontiers. Unit 3- Students will learn to apply motivation
	Electronic Devices	**KEC301**	Physics. 2. Understand and utilize the mathematical models of semiconductor junctions. 3. Understand carrier transport in semiconductors and design resistors.

SEM III	**Digital System Design**	**KEC302**	circuits. 2. Design and analyze modular combinational circuits with MUX / DEMUX, Decoder & Encoder 3. Design & analyze synchronous sequential logic circuits
	Network Analysis and Synthesis	**KEC303**	nodal and mesh analysis. 2. Appreciate electrical network theorems. 3. Apply Laplace transform for steady state and transient analysis. 4. Determine different network functions.
SEM IV	**Communication Engineering**	**KEC401**	modulation schemes for their efficiency and bandwidth. 2. Analyze the behavior of a communication system in presence of noise. 3. Investigate pulsed modulation system and analyze their system performance.
	Analog Circuits	**KEC402**	transistors. 2. Design and analyze various rectifier and amplifier circuits. 3. Design sinusoidal and non-sinusoidal oscillators.
	Signal System	**KEC403**	2. Analyze linear shift-invariant (LSI) systems. 3. Represent continuous and discrete systems in time and frequency domain using Fourier series and transform. 4. Analyze discrete time signals in z-domain. 5. Study sampling and reconstruction of a signal.
	Integrated Circuits	**KEC-501**	741-IC. 2. Examine and design Op-Amp based circuits and basic components of ICs such as various types of filter. 3. Implement the concept of Op-Amp to design Op-Amp based non-linear applications and wave-
	Microprocessor & Microcontroller	**KEC-502**	2. Illustrate the programming model of microprocessors & write program using 8085 microprocessor. 3. Demonstrate the basics of 8086 Microprocessor and interface different external Peripheral Devices like timer, USART etc. with Microprocessor (8085/8086).
	Digital Signal Processing	**KEC-503**	realizations of digital systems (IIR and FIR) and their utilities. 2. Select design parameters of analog IIR digital filters (Butterworth and Chebyshev filters) and implement various methods such as impulse invariant transformation and bilinear transformation of conversion of analog to digital filters. 3. Design FIR filter using various types of window functions.

	Computer Architecture and Organization	**KEC-051**	design methodology and processor level design. 2. Explain the basics of processor and basic formats of data representation. 3. Perform fixed and floating point arithmetic operations.
	Industrial Electronics	**KEC-052**	power switching devices and identify their ratings and applications. 2. Recognize the requirement of SCR Protection and describe the Functioning of SCR. 3. Analyze and design Power Converter based on SCR for various Industrial Applications.
SEM VI	**VLSI Technology**	**KEC-053**	preparation and wafer cleaning. 2. Evaluate the process of Epitaxy and oxidation. 3. Differentiate the lithography, etching and deposition process. 4. Analyze the process of diffusion and ion
	Advance Digital Design using Verilog	**KEC-054**	implementation. 2. Implement combinational circuits using mixed logic and Verilog. 3. Design sequential circuits using mixed logic and Verilog with mapping of Algorithm.
	Electronics Switching	**KEC-055**	switching and distinguish complex telephone systems. 2. Differentiate the fundamentals of Space division switching and time division switching. 3. Design, develop and evaluate the telecom traffic to meet defined specifications and needs.
	Advance Semiconductor Device	**KEC-056**	biasing and as CE amplifier circuit. 2. Describe the Tunnel diode and IMPATT diode. 3. Explain the basics of Light-Emitting Diode (LED) and evaluate the performance of Photoconductor and photodiode. 4. Distinguish the performance of Photoconductor, photodiode, Phototransistor,
	Electronics Measurement & Instrumentation	**KEC-057**	Measurement system and various measurement errors. 2. Analyze and design voltmeter circuits, AC electronic voltmeter, digital frequency meter and current measurement with electronic instruments. 3. Evaluate various resistance and impedance measuring methods using Bridges and Q-meter.
	Optical Communication	**KEC-058**	theory of optical communication. 2. Describe the signal losses with their computation and dispersion mechanism occurring inside the optical fiber cable. 3. Differentiate the optical sources used in optical communication with their comparative study.

	Digital Communication	**KEC-601**	communication theory. 2. To demonstrate the concepts involved in digital communication. 3. To explain the concepts of digital modulation schemes.
	Control System	**KEC-602**	with different types of feedback and its effect. Additionally they will also be able to explain the techniques such as block diagrams reduction, signal flow graph and modelling of various physical systems along with modelling of DC servomotor. 2. Explain the concept of state variables for the representation of LTI system. 3. Interpret the time domain response analysis for various types of inputs along with the time
	Antenna and Wave Propagation	**KEC-603**	their applications in electromagnetic field theory to establish a relation between any two systems using the vector calculus. 2. Explain the concept of static electric field, current and properties of conductors.
SEM VI	**Microcontroller & Embedded System Design**	**KEC-061**	architectures and AVR family architecture and compare them for different applications. 2. To demonstrate the basics of MSP430x5x Microcontroller 3. To execute the I/O interfacing and peripheral devices associated with Microcontroller SoC (system on chip). 4. Explain the advance concept Arm Cortex-M4
	Satellite Communication	**KEC-062**	communication. 2. Demonstrate orbital mechanics principles of satellite communication systems and solve problems related to it. 3. Describe a satellite link and identify ways to
	Data Communication Networks	**KEC-063**	architecture of a network. 2. Analyze the services and features of various protocol layers in data layer. 3. Demonstrate the knowledge of multiple access to design a access technique for a particular application.
	Analog Signal Processing	**KEC-064**	processing in analog domain and its associated concepts like OTA and current conveyor. 2. Introduction of filter and its designing parameters 3. Solve problems and design higher order filters like Butterworth and Chebyshev. 4. Understand and explain the reasons for delay in filter designing and its procedure to equalize.
	Random Variables & Stochastic Process	**KEC-065**	learning of Probability. 2. Students will be able to demonstrate the concept of Random Variables. 3. Students will be able to analyze Multiple Random Variables.

	Data Communication Networks	**REC701**	architecture of a network. CO2 Understand the ISO/OSI seven layers in a network. CO3 Realize protocols at different layers of a
	VLSI Design	**REC702**	CO2 Design combinational and sequential circuits using CMOS gates CO3 Identify the sources of power dissipation in a CMOS circuit.
	Optical Network	**REC070**	Familiarize with multiplexing techniques, second generation optical networks, The optical layer, optical packet switching. CO2 Understand the concept of Principles of operation, Conservation of energy, Isolators and circulators: Principles of operation. CO3 Understand the basics of Multiplexing, SONET/SDH layers, SONET Frame structure, SONET/SDH physical layer, Elements of a SONET/SDH infrastructure. CO4 To gain knowledge of Routing and wavelength assignment problems, Dimensioning
	Information Theory & Coding	**REC071**	Model the Entropy, Joint Entropy and Conditional Entropy, Relative Entropy and Mutual Information, Relationship Between Entropy and Mutual Information CO2 Design Data Compression, Examples of Codes, Kraft Inequality, Optimal Codes, Bounds on the Optimal Code Length CO3 Identify the Examples of Channel Capacity, Symmetric Channels, Properties of Channel Capacity, Preview of the Channel Coding Theorem. CO4
	Digital Image Processing	**REC072**	and their properties CO2 Choose appropriate technique for image enhancement both in spatial and frequency Domains. CO3 Identify causes for image degradation and apply restoration techniques.

SEM VII	**Advance Programming in Engineering**	**REC073**	Understand the fundamentals of Matlab programming as well as understand and apply advance level programming techniques for solving problems using numerical methods. CO2 Learn, apply, and investigate Matlab applications in advance communication systems. CO3 Apply and investigate stability of systems and processes using time domain and frequency domain stability criterions like Routh-Hurwitz, State-space representation,
	Optical Communication	**REC075**	of Optical Communication CO2 Demonstrate OPCOMM components, assemble them and solve problems on Optical Communication system CO3 Able to design, implements, analyse and maintains optical communication system CO4 Gain knowledge of different source of light as well as receiver and their comparative study
	Filter Design	**REC076**	given signal. CO2 Choose appropriate decimation and interpolation factors for high performance filters.
	Applied Fuzzy Electronic Systems	**REC077**	Understand the Operations of Fuzzy Sets, Properties of Fuzzy Sets, Geometric Interpretations of Fuzzy Sets, Possibility Theory. CO2 Design Fuzzy Mapping Rule, Fuzzy Implication Rule, Fuzzy Rule Based Models for Function Approximations, Theoretical Foundation of Fuzzy Mapping Rules, Types of Fuzzy Rule Based Models. CO3 Realization of Fuzzy Sets and their properties; Cardinality of Classical Relations and their properties. CO4 Aware Principle of Vertex Method, DSW
	Computerized Process Control	**REC078**	Understand the Role of computers in process control, Elements of a computer aided Process control System, Classification of a Computer. CO2 Design Phase Locked Local Loop, Mixers. Time Division Multiplexed System – TDM/PAM system CO3 Realize Process model, Physical model, Control Model. Modelling Procedure.

	Electronic Switching	**REC080**	telecommunication systems and associated technologies. CO2 Solve problems and design simple systems related to tele-traffic and trunking efficiency. CO3 Understand and explain the reasons for switching, and the relative merits of the possible switching
	Analytical Instrumentation	**REC081**	Understand the Electromagnetic Radiation, Laws relating to absorption radiation, Absorption Instruments, Ultraviolet and visible absorption spectroscopy, Calorimeters. CO2 Design basic components of IR Spectrophotometers, Type of Infrared Spectrophotometers, Sample Handling Techniques. CO3 Learnprinciple, constructional details of flame photometers, types of flame photometers, types of flame photometers.
	Advanced Display Technologies & Systems	**REC082**	Understand Anatomy of Eye, Light Detection and Sensitivity, Spatial Vision and Pattern Perception, Binocular Vision and Depth Perception. CO2 Understand Photolithography for Thin Film LCD, Wet Etching, Dry Etching; Flexible Displays. CO3 Understand Thin Film Electroluminescent Displays, AC Powder Electroluminescent Displays; Organic Electroluminescent Displays: OLEDs, Active Matrix for OLED Displays CO4
SEM VIII	**Satellite & RADAR systems**	**REC083**	principles of satellite communication systems CO2 Architect, interpret, and select appropriate technologies for implementation of specified satellite communication systems CO3 Analyse and evaluate a satellite link and suggest enhancements to improve the link performance. CO4 Select an appropriate modulation, multiplexing, coding and multiple access schemes for a given satellite communication link.

Wireless & Mobile Communication	**REC085**	mobile communications. CO2 Understand the concept of cellular communication. CO3 Understand the basics of wireless communication. CO4 Understand GSM mobile communication standard, its architecture, logical channels, advantages and limitations.
Voice Over IP	**REC086**	signalling systems. CO2 Design SIP Architecture. CO3 Model and estimate media gateways. CO4 Understand the network synchronization and management.
Speech Processing	**REC087**	Understand the mechanism of speech production & acoustic phonetics, the acoustic theory of speech production, lossless tube models. CO2 Understand time dependent processing of speech, short time energy and average magnitude, short time average zero crossing rate. CO3 Design of filter banks, implementation of filter bank summation method using FFT. CO4 Evaluate homomorphic system for convolution,
Micro and Smart Systems	**REC088**	Microsystems versus MEMS, Why micro fabrication. CO2 Design Silicon capacitive accelerometer, piezo-resistive pressure sensor, conductometric gas sensor. CO3 Realizesilicon as a material for micro machining, thin film deposition, lithography, etching, silicon micromachining. CO4 Understand bar, beam, energy methods for elastic bodies, heterogeneous layered beams, bimorph effect, residual stress and stress

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2020-21)

BTECH ELECTRICAL ENGGINERING

PROGRAMME OUTCOME

By the culmination of this program, the graduate acquires the ability to

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	**KAS101T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes. 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent
	ENGINEERING CHEMISTRY	**KAS101T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.

ENGINEERING MATHEMATICS-I	**KAS103T**	CO 1. Remember the concept of matrices and apply for solving linear simultaneous equations. CO 2. Understand the concept of limit continuity and differentiability and apply in the study of Rolle,s, Lagrange,s and Cauchy mean value theorem and Leibnitz theorems . CO 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. CO 4. Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of
BASIC ELECTRICAL ENGINEERING	**KEE101T**	theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC101T**	devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of Operational amplifier 4. Understand the concept of measurement instrument. 5. Understand the working principle of different type of sensor and their uses.
PROGRAMMING FOR PROBLEM SOLVING	**KCS101T**	logical problems. 2. To translate the algorithms to programs & execution (in C language) 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and synthesize a complete program using divide and
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME101T**	CO1. Understand the concept of stress and strain, factor of safety, beams. CO2. Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3. Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4. Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system.

SEM I	**ENGINEERING PHYSICS LAB**	**KAS151P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil.
	ENGINEERING CHEMISTRY LAB	**KAS152P**	surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits.
	ENGINEERING CHEMISTRY LAB	**KAS152P**	surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS151P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage.
	ENGLISH LANGUAGE LAB	**KAS154P**	objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc.

	ENGINEERING GRAPHICS & DESIGN LAB	**KCE151P**	engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design. 6. Analysis of Isometric views.
	MECHANICAL WORKSHOP LAB	**KWS151P**	machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop. CO4 Perform operations in welding, moulding,
	ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC101**	approaches of AI CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks. CO5 Understand the concepts of face, object,
	EMERGING TECHNOLOGY FOR ENGINEERING	**KMC102**	smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones. CO5 Understand augmented reality (AR), virtual
	SOFT SKILL I	**KNC101**	correct usage of grammar. Unit 2- Students will apply the fundamental inputs of communication skills in making speech delivery, individual conference, and group communication. Unit 3-Students will evaluate the impact of interpersonal Communication on their performance as a professional and in obtaining professional excellence at the workplace. Unit 4-Skills and techniques of persuasion and negotiation would enhance the level of students at multifarious administrative and managerial
	ENGINEERING PHYSICS	**KAS201T**	problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply

ENGINEERING CHEMISTRY	**KAS202T**	2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.
ENGINEERING MATHEMATICS-II	**KAS203T**	CO 2 Remember the concept of definite integral and apply for evaluating surface areas and volumes. K1, K3 & K5 CO 3 Understand the concept of convergence of sequence and series. Also evaluate Fourier series. CO 4 Illustrate the working methods of complex functions and apply for finding analytic functions. CO 5 Apply the concept of complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.
BASIC ELECTRICAL ENGINEERING	**KEE201T**	theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC201T**	devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of perational amplifier 4. Understand the concept of measurement instrument. 5. Understand the working principle of different type of sensor and their uses.
PROGRAMMING FOR PROBLEM SOLVING	**KCS201T**	logical problems. 2. To translate the algorithms to programs & execution (in C language). 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and synthesize a complete program using divide and
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME201T**	factor of safety, beams. CO2 Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3 Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4 Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system. CO5 Understand concept of mechatronics with their advantages, scope and Industrial application,

	ENGINEERING PHYSICS LAB	**KAS251P**	Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil. 4. To draw hysteresis (B-H curve) of a specimen in
	ENGINEERING CHEMISTRY LAB	**KAS252P**	surface tension, viscosity. 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
SEM II	**BASIC ELECTRICAL ENGINEERING LAB**	**KEE251P**	of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials. 4. Calculate efficiency of a single phase transformer
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS251P**	flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications also he/she
	ENGLISH LANGUAGE LAB	**KAS254P**	objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/ administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical

ENGINEERING GRAPHICS & DESIGN LAB	**KCE251P**	engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design. 6. Analysis of Isometric views.
MECHANICAL WORKSHOP LAB	**KWS251P**	machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop. CO4 Perform operations in welding, moulding,
ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC201**	approaches of AI. CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks. CO5 Understand the concepts of face, object,
EMERGING TECHNOLOGY FOR ENGINEERING	**KMC202**	smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones. CO5 Understand augmented reality (AR), virtual
SOFT SKILL II	**KNC201**	effective LSRW skills in English. Unit 2- Students will evaluate the importance of conversation in their personal and professional domain and apply it for extending their professional frontiers. Unit 3- Students will learn to apply motivation skills for their individual and professional excellence. Unit 4- Students will utilize their teamwork and their interpersonal communication skills to survive and excel at their work-place.

SEM III	**Electromagnetic Field Theory**	**KEE301**	application in electromagnetic field theory, establish a relation between any two systems and also understand the vector calculus. K3 CO2 Understand the concept of static electric field. Understand the concept of current and properties of conductors. Establish boundary conditions and to calculate capacitances of different types of capacitors K4 CO3 Understand the concept of static magnetic field, magnetic scalar and vector potential K4 CO4 Understand the forces due to magnetic field, magnetization, magnetic boundary
	Electrical Measurements & Instrumentation	**KEE302**	identify and use different types of instruments for the measurement of voltage, current, power and energy. K1 CO2 Display the knowledge of measurement of electrical quantities resistance, inductance and capacitance with the help of bridges. K2 CO3 Demonstrate the working of instrument transformers as well as calculate the errors in current and potential transformers. K2 CO4 Manifest the working of electronic instruments like voltmeter, multi-meter, frequency meter and CRO.
	Basic Signals & Systems	**KEE303**	systems and can perform mathematical operations on them. K2 CO2 Analyze the response of LTI system to Fourier series and Fourier transform and to evaluate their applications to network analysis. K4 CO3 Analyze the properties of continuous time signals and system using Laplace transform and determine the response of linear system to known inputs. K4
	Digital Electronics	**KEE401**	implementation of Gates. K3 CO2 Analyze and design of Combinational logic circuits. K4 CO3 Analyze and design of Sequential logic circuits with their applications. K4

SEM IV	**Electrical Machines-I**	**KEE402**	involved in Electromechanical Energy conversion. K4 CO2 Demonstrate the constructional details of DC machines as well as transformers, and principle of operation of brushless DC motor, Stepper and DC Servo motors. K2 CO3 Evaluate the performance and characteristics of DC Machine as motor and as well as generator.
	Networks Analysis & Synthesis	**KEE403**	nodal and mesh methods of circuit analysis and simplify the network using Graph Theory approach. K3 CO2 Analyze the AC and DC circuits using Kirchhoff's law and Network simplification theorems. K4 CO3 Analyze steady-state responses and transient response of DC and AC circuits using classical and Laplace transform methods. K4 CO4 Demonstrate the concept of complex
	Power System - I	**KEE501**	Describe the working principle and basic components of conventional power plants as well as the other aspects of power generation. K2 CO2 Recognize elements of power system and their functions, as well as compare the different types of supply systems. Illustrate different types of conductors, transmission lines and various performance parameters of transmission line for short, medium and long transmission line. K4 CO3 Calculate sag and tension in overhead lines with and without wind and ice loading. Classify different type of insulators, determine potential distribution over a string of insulator, string efficiency and its improvement. K4 CO4 Compute the inductance and capacitance of single phase, three phase lines with

SEM V	**Control System**	**KEE502**	Obtain transfer functions to predict the correct operation of open loop and closed loop control systems and identify the basic elements, structures and the characteristics of feedback control systems. K3 CO 2 Measure and evaluate the performance of basic control systems in time domain. Design specification for different control action. K4 CO 3 Analyze the stability of linear time-invariant systems in time domain using Routh- Hurwitz criterion and root locus technique. K4 CO 4 Determine the stability of linear time-invariant systems in frequency domain using Nyquist criterion and Bode plot. K4 CO 5
	Electrical Machines-II	**KEE503**	Demonstrate the constructional details and principle of operation of three phase Induction and Synchronous Machines. K3 CO 2 Analyze the performance of the three phase Induction and Synchronous Machines using the phasor diagrams and equivalent circuits. K4 CO 3 Select appropriate three phase AC machine for any application and appraise its significance. K4 CO 4 Start and observe the various characteristics of three phase Induction & Synchronous Machines K4 CO 5
	Robotics	**KEE051**	K2 CO2 Conceptualize 3-D translation & orientation of robot arm kinematics. K3 CO3 Understand different robotic actuators and power transmission systems. K3

Sensors and Transducers	**KEE052**	Understand the working of commonly used sensors in industry for measurement of displacement, force and pressure. K3 CO2 Recognize the working of commonly used sensors in industry for measurement of temperature, position, accelerometer, vibration sensor, flow and level. K3 CO3 Identify the application of machine vision. K2
Industrial Automation and Control	**KEE053**	Understand the concept of automation, its terminology and basic communication protocol. K2 CO2 Apply Relay logic for automation. K3 CO3 Learn about PLC, its operation and application in automation. K3 CO4 Analyze the industrial sensors, its terminology
Electrical Standards and Engineering Practices	**KEE054**	Electrical Standards in practice K2 CO2 Understand Indian standards for cables, lighting and motors. K3 CO3 Understand Indian standards of transformers, LV & HV switchgears K3
Optimization Techniques	**KEE055**	techniques in engineering applications K2 CO2 Learn optimization methods for solving linear programming problems K3 CO3 Learn optimization methods for solving nonlinear programming problems K3
Neural Networks & Fuzzy System	**KEE056**	networks and their learning techniques. K3 CO2 Comprehend the architecture, develop algorithms and apply the concepts of back propagation networks. K5 CO3 Differentiate between the fuzzy and the crisp sets, apply the concepts of fuzziness and the fuzzy set theory. K4 CO4 Select the membership functions, write rules and develop the fuzzy controller for

	Digital Signal Processing	**KEE057**	Represent discrete sequence and LTI systems, frequency domain of discrete sequence. Compute Fourier transform. Draw structure of systems based on System type-IIR & FIR Systems. K2 CO2 Describe sampling of signal and its reconstruction, processing of continuous time and discrete time signals. Sampling rate variation and application of multirate signal processing. Sampling effect in A/D and D/A conversion. K3 CO3 Evaluate the response of LTI system and rational system function. Drive linear phase systems. Compute discrete Fourier transform (DFT) and calculate linear and circular convolution. K5 CO4 Design IIR & FIR filters with the desired specification with the help of impulse invariant and bilinear transformation method for
	Analog & Digital Communication	**KEE058**	communication system. K2 CO2 Comprehend the Frequency & Phase modulation. K2 CO3 Realize the Pulse Modulation Techniques. K2 CO4 Get the Digital Modulation Techniques and
	Power System-II	**KEE601**	Identify power system components on one line diagram of power system and its representation including the behaviour of the constituent components and sub systems and Analyse a network under both balanced and unbalanced fault conditions and design the rating of circuit breakers. K4 CO2 Perform load flow analysis of an electrical power network and interpret the results of the analysis. K4 CO3 Describe the concept of travelling waves in transmission lines and use the travelling wave theory to determine the over voltage caused by surge propagation in transmission networks. K4 CO4 Assess the steady state and transient stability of the power system under various conditions.

	Microprocessor and Microcontroller	**KEE602**	8086 microprocessors K2 CO2 Illustrate the programming model of microprocessors & write program using 8085 microprocessor K3 CO3 Interface different external peripheral devices with 8085 microprocessor K3 CO4 Comprehend the architecture of 8051 microcontroller K2 CO5
	Power Electronics	**KEE603**	Demonstrate the characteristics as well as the operation of BJT, MOSFET, IGBT, SCR, TRIAC and GTO and identify their use in the power switching applications. K4 CO2 Comprehend the non-isolated DC-DC converters and apply their use in different Power electronics applications. K3 CO3 Analyze the phase controlled rectifiers and evaluate their performance parameters. K5 CO4 Apprehend the working of single-phase ac voltage controllers, cyclo-converters and their various applications. K3
SEM VI	**Special Electrical Machines**	**KEE 061**	Describe the working principle, Constructional Features of different types of electrical machines including the fractional kilowatt machines. K2 CO2 Analyse torque- speed characteristics of different electrical machines and interpret their performance and identify the suitable machine for an operation. K4 CO3 Study different types of control techniques for a machine and identify the best control strategy based upon different constraints. K4 CO4

	Electrical Machine Design	**KEE 062**	machines and calculate mmf and magnetizing current. K5 CO2 Design the core, yoke, windings and the cooling system of a transformer. K6 CO3 Illustrate the core and armature design of DC and 3-phase synchronous machine. Design design of three phase induction motors, field system of DC machine and synchronous machines. K6 CO4 Analyse computer aided design approaches
	Digital Control System	**KEE 063**	Represent discrete time systems under the form of z-domain transfer functions and state-space models. K3 CO 2 Obtain the model of discrete-time systems by pulse transfer function. K4 CO 3 Analyze stability, transient response and steady state behaviour of linear discretetime systems, analytically and numerically using tools such as MATLAB and Simulink K4 CO 4 Design sampled data control systems. K5
	Electrical and Hybrid Vehicles	**KEE 064**	Choose a suitable drive scheme for developing an electric hybrid vehicle depending on resources K3 CO2 Design and develop basic schemes of electric vehicles and hybrid electric vehicles. K6 CO3 Choose proper energy storage systems for vehicle applications K5 CO4 Identify various communication protocols and
	Understanding the Human Being Comprehensibly - Human Aspiration and its Fulfilments- Understanding the Human Being Comprehensibly - Human Aspiration and its Fulfilments	**ROE-074**	human aspirations, goal, activities and purpose of life K1 CO2 To felicitate the competence to understand the harmony in nature/existence and participation of human being in the nature/existence K2 CO3 To help the students to develop the

SEM VII	**Utilization of Electrical Energy and Electric Traction**	**REE-071**	in efficient utilization of electrical power. K2 CO2 Apply the power electronics technology in efficient utilization of electrical power K3 CO3 Analyze the effective utilization of power electronics technology in electrical traction. K4 CO4 Evaluate the power electronics technology in
	Energy Efficiency and conservation	**REE-076**	of the subject to calculate the efficiency if various thermal utilities. K5 CO2 Students will be able to design suitable energy monitoring system to analyse and optimize the energy consumption in an organization. K6 CO3 Students will be able to improve the thermal efficiency by designing suitable systems for heat recovery and cogeneration. K3 CO4 Students will be able to use energy audit methods to identify the areas deserving tighter control to save energy expenditure. K3 CO5 Students will be able to carry out the cost
	Communication system	**REN-071**	communication and explain the conventional digital communication system. K3 CO2 Apply the knowledge of signals and evaluate the performance of digital communication system in presence of noise. K3 CO3 Apply the knowledge of digital electronics and describe the error control codes like block code, cyclic codes etc. K3 CO4 Evaluate the results to provide valid conclusions for different modulators and demodulators using hardware

	Power System & Protection	**REE-721**	breakers used in power system. K1 CO2 Students will be able to identify different protection zones and protection schemes in power system. K2 CO3 Students will be able to differentiate various including distance and differential protection scheme. K4 CO4 Students will be able to explain the working principle of static relays . K5 CO5 Students will be able to summarize the protection schemes for generator, transformer, motor, feeder and
SEM VIII	**Renewable Energy Resources**	**ROE-086**	conventional energy resources . K1 CO2 Understand the need of renewable energy resources , historical and latest developments. K2 CO3 Evaluate the use of solar energy and the various components used in the energy production with respect to applications like heating,cooling,desalination, power generation , drying ,cooking etc. K5 CO4 Analyze the need of wind energy and various components used in energy generation and know the classifications. K4 CO5 Analyze Solar,Wind and Bio energy system
	Introduction to Power Quality and FACTS	**REE081**	parameters, the sources of the power quality problems and the definitions of power quality parameters K2 CO2 Analyse computational methods to calculate active and reactive power and FFT for calculation of harmonic components. K4 CO3 Understand the power quality monitoring systems K2

	. EHVAC & DC Transmission	**REE085**	HVDC transmission. and identify the electrical requirements for HVDC lines K2 CO2 To apply the components used in AC to DC conversion K3 CO3 Understand the operation of HVDC conversion technology and fundamental requirements of HVDC transmission line design K2 CO4 Students will understand the effects of corona like Audible

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2020-21)

BTECH MECHANICAL ENGGINERING

PROGRAMME OUTCOME

By the culmination of this program, the graduate acquires the ability to

1. Analyze, identify and solve engineering problems, through application of knowledge in mathematics, science and engineering to function as good mechanical engineers and lead the people associated with.

2. Identify, formulate and solve engineering problems related to various materials and their properties using skills, techniques and state of art engineering tools.

3. Have good awareness of the trends in design, manufacturing, production and marketing.

4. Apply the mechanical engineering principles to design sound components which can be assembled into systems.

5. Select suitable materials with required properties for the designed components and system.

6. Understand and analyse the thermal and mechanical behaviour of the materials and systems.

7. Identify and apply the most suitable process to manufacture the components.

8. Interpret and use the experimental and field data to make oral / written presentations as required.

9. Understand the ethical requirements of the profession, the need for lifelong learning and the impacts of mechanical engineering activities on society.

10. Manage the job floor of an industry or a research organization efficiently and effectively by the optimized utilization of the resources for the maximum output.

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	ENGINEERING PHYSICS	**KAS101T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes. 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent Streams.
	ENGINEERING CHEMISTRY	**KAS101T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water.
	ENGINEERING MATHEMATICS-I	**KAS103T**	CO 1. Remember the concept of matrices and apply for solving linear simultaneous equations. CO 2. Understand the concept of limit continuity and differentiability and apply in the study of Rolle,s, Lagrange,s and Cauchy mean value theorem and Leibnitz theorems . CO 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. CO 4. Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of gravity. CO 5. Remember the concept of vector and apply for directional

BASIC ELECTRICAL ENGINEERING	**KEE101T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ them in different area of applications. 5. Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC101T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of Operational amplifier 4. Understand the concept of measurement instrument. 5. Understand the working principle of different type of sensor and their uses. 6. Understand the concept of IoT system & Understand the component of IoT system.
PROGRAMMING FOR PROBLEM SOLVING	**KCS101T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language) 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach. 5. To use arrays, pointers and structures to develop algorithms and programs.
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME101T**	CO1. Understand the concept of stress and strain, factor of safety, beams. CO2. Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3. Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4. Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system. CO5.Understand concept of mechatronics with their advantages, scope and Industrial application, the different types of mechanical actuation system, the different types of hydraulic and pneumatic systems. CO6. Apply concepts of strength of material for safe design, refrigeration for calculation of COP, concepts of fluid mechanics in real life, concepts of measurements in production systems.
ENGINEERING	**KAS151P**	1. To determine the wavelength of sodium light by Newton‟s ring

	PHYSICS LAB		Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel"s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil. 4. To draw hysteresis (B-H curve) of a specimen in the form of a
	ENGINEERING CHEMISTRY LAB	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials. 4. Calculate efficiency of a single phase transformer and DC machine. 5. Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction.
SEM I	**ENGINEERING CHEMISTRY LAB**	**KAS152P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity, 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.
	BASIC ELECTRICAL ENGINEERING LAB	**KEE151P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials. 4. Calculate efficiency of a single phase transformer and DC machine. 5. Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction.

PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS151P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self education and ability for life-long learning needed for Computer language.
ENGLISH LANGUAGE LAB	**KAS154P**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/ administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.
ENGINEERING GRAPHICS & DESIGN LAB	**KCE151P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design. 6. Analysis of Isometric views. 7. Creating working drawings.

	MECHANICAL WORKSHOP LAB	**KWS151P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop. CO4 Perform operations in welding, moulding, casting and gas cutting. CO5 Fabricate a job by 3D printing manufacturing technique.
	ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC101**	CO1 Understand the evolution and various approaches of AI CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks. CO5 Understand the concepts of face, object, speech recognition and Robots.
	EMERGING TECHNOLOGY FOR ENGINEERING	**KMC102**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones. CO5 Understand augmented reality (AR), virtual reality (VR), 5G technology, brain computer interface and human brain.
	SOFT SKILL I	**KNC101**	Unit 1- Students will be enabled to understand the correct usage of grammar. Unit 2- Students will apply the fundamental inputs of communication skills in making speech delivery, individual conference, and group communication. Unit 3-Students will evaluate the impact of interpersonal Communication on their performance as a professional and in obtaining professional excellence at the workplace. Unit 4-Skills and techniques of persuasion and negotiation would enhance the level of students at multifarious administrative and managerial platforms. Unit 5-Student will be able to equip with basics of communication skills and will apply it for practical and oral purposes by being honed up in presentation skills and voice-dynamics.

ENGINEERING PHYSICS	**KAS201T**	1. To solve the classical and wave mechanics problems. 2. To develop the understanding of laws of thermodynamics and their application in various processes 3. To formulate and solve the engineering problems on Electromagnetism & Electromagnetic Field Theory. 4. To aware of limits of classical physics & to apply the ideas in solving the problems in their parent streams.
ENGINEERING CHEMISTRY	**KAS202T**	1. Use of different analytical instruments. 2. Measure molecular/ system properties such as surface tension, viscosity, conductance of solution, chloride and iron content in water. 3. Measure hardness of water. 4. Estimate the rate constant of reaction.
ENGINEERING MATHEMATICS-II	**KAS203T**	CO 1 Understand the concept of differentiation and apply for solving differential equations. CO 2 Remember the concept of definite integral and apply for evaluating surface areas and volumes. K1, K3 & K5 CO 3 Understand the concept of convergence of sequence and series. Also evaluate Fourier series. CO 4 Illustrate the working methods of complex functions and apply for finding analytic functions. CO 5 Apply the concept of complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.
BASIC ELECTRICAL ENGINEERING	**KEE201T**	1. Apply the concepts of KVL/KCL and network theorems in solving DC circuits. 2. Analyze the steady state behavior of single phase and three phase AC electrical circuits. 3. Identify the application areas of a single phase two winding transformer as well as an auto transformer and calculate their efficiency. Also identify the connections of a three phase transformer. 4. Illustrate the working principles of induction motor, synchronous machine as well as DC machine and employ. them in different area of applications. 5. Describe the components of low voltage electrical installations and perform elementary calculations for energy consumption.
EMERGING DOMAIN IN ELECTRONICS ENGINEERING	**KEC201T**	1. Understand the concept of PN Junction and devices. 2. Understand the concept of BJT, FET and MOFET. 3. Understand the concept of perational amplifier 4. Understand the concept of measurement instrument. 5. Understand the working principle of different type of sensor and their uses. 6. Understand the concept of IoT system & Understand the component of IoT system.

PROGRAMMING FOR PROBLEM SOLVING	**KCS201T**	1. To develop simple algorithms for arithmetic and logical problems. 2. To translate the algorithms to programs & execution (in C language). 3. To implement conditional branching, iteration and recursion. 4. To decompose a problem into functions and synthesize a complete program using divide and conquer approach. 5. To use arrays, pointers and structures to develop algorithms and programs.
FUNDAMENTALS OF MECHANICAL ENGINEERING & MECHATRONICS	**KME201T**	CO1 Understand the concept of stress and strain, factor of safety, beams. CO2 Understand the basic component and working of internal combustion engines, electric and hybrid vehicles, refrigerator and heat pump, air conditioning. CO3 Understand fluid properties, conservation laws, hydraulic machinery used in real life. CO4 Understand the working principle of different measuring instrument with the knowledge of accuracy, error and calibration, limit, fit, tolerance and control system. CO5 Understand concept of mechatronics with their advantages, scope and Industrial application, the different types of mechanical actuation system, the different types of hydraulic and pneumatic systems. CO6 Apply concepts of strength of material for safe design, refrigeration for calculation of COP, concepts of fluid mechanics in real life, concepts of measurements in production systems.
ENGINEERING PHYSICS LAB	**KAS251P**	1. To determine the wavelength of sodium light by Newton‟s ring Experiment. 2. To determine the wavelength of sodium light with the help of Fresnel‟s bi-prism. 3. To determine the variation of magnetic field with the distance along the axis of a current carrying coil and estimate the radius of the coil. 4. To draw hysteresis (B-H curve) of a specimen in the form of a transformer and to determine its hysteresis loss.
ENGINEERING CHEMISTRY LAB	**KAS252P**	1. Use of different analytical instruments. 2. Measure molecular/system properties such as surface tension, viscosity. 3. Measure conductance of solution, chloride and iron content in water, hardness of water. 4. Estimate the rate constant of reaction.

SEM II	**BASIC ELECTRICAL ENGINEERING LAB**	**KEE251P**	1. Conduct experiments illustrating the application of KVL/KCL and network theorems to DC electrical circuits. 2. Demonstrate the behavior of AC circuits connected to single phase AC supply and measure power in single phase as well as three phase electrical circuits. 3. Perform experiment illustrating BH curve of magnetic materials. 4. Calculate efficiency of a single phase transformer and DC machine. 5. Perform experiments on speed measurement and reversal of direction of three phase induction motor and Identify the type of DC and AC machines based on their construction.
	PROGRAMMING FOR PROBLEM SOLVING LAB	**KCS251P**	CO 1 Able to implement the algorithms and draw flowcharts for solving Mathematical and Engineering problems. CO 2 Demonstrate an understanding of computer programming language concepts. CO 3 Ability to design and develop Computer programs, analyzes, and interprets the concept of pointers, declarations, initialization, operations on pointers and their usage. CO 4 Able to define data types and use them in simple data processing applications also he/she must be able to use the concept of array of structures. CO 5 Develop confidence for self education and ability for life-long learning needed for Computer language.
	ENGLISH LANGUAGE LAB	**KAS254P**	1. Students will be enabled to understand the basic objective of the course by being acquainted with specific dimensions of communication skills i.e. Reading, Writing, Listening, Thinking and Speaking. 2. Students would be able to create substantial base by the formation of strong professional vocabulary for its application at different platforms and through numerous modes as Comprehension, reading, writing and speaking etc. 3. Students will apply it at their work place for writing purposes such as Presentation/official drafting/ administrative communication and use it for document/project/report/research paper writing. 4. Students will be made to evaluate the correct and error-free writing by being well-versed in rules of English grammar and cultivate relevant technical style of communication &presentation at their work place and also for academic uses. 5. Students will apply it for practical and oral presentation purposes by being honed up in presentation skills and voice-dynamics. They will apply techniques for developing interpersonal communication skills and positive attitude leading to their professional competence.

ENGINEERING GRAPHICS & DESIGN LAB	**KCE251P**	1. Understanding of the visual aspects of engineering design. 2. Understanding of engineering graphics standards and solid modeling. 3. Effective communication through graphics. 4. Applying modern engineering tools necessary for engineering practice. 5. Appling computer-aided geometric design. 6. Analysis of Isometric views. 7. Creating working drawings.
MECHANICAL WORKSHOP LAB	**KWS251P**	CO1 Use various engineering materials, tools, machines and measuring equipments. CO2 Perform machine operations in lathe and CNC machine. CO3 Perform manufacturing operations on components in fitting and carpentry shop. CO4 Perform operations in welding, moulding, casting and gas cutting. CO5 Fabricate a job by 3D printing manufacturing technique.
ARTIFICAL INTELLIGENCE FOR ENGINEERS	**KMC201**	CO1 Understand the evolution and various approaches of AI. CO2 Understand data storage, processing, visualization, and its use in regression, clustering etc. CO3 Understand natural language processing and chatbots. CO4 Understand the concepts of neural networks. CO5 Understand the concepts of face, object, speech recognition and Robots.
EMERGING TECHNOLOGY FOR ENGINEERING	**KMC202**	CO1 Understand the concepts of internet of things, smart cities and industrial internet of things. CO2 Understand the concepts of cloud computing. CO3 Understand the concepts of block chain, cryptocurrencies, smart Contracts. CO4 Understand design principles, tools, trends in 3 D printing and drones. CO5 Understand augmented reality (AR), virtual reality (VR), 5G technology, brain computer interface and human brain.

	SOFT SKILL II	**KNC201**	Unit 1- Students will be able to converse well with effective LSRW skills in English. Unit 2- Students will evaluate the importance of conversation in their personal and professional domain and apply it for extending their professional frontiers. Unit 3- Students will learn to apply motivation skills for their individual and professional excellence. Unit 4- Students will utilize their teamwork and their interpersonal communication skills to survive and excel at their work-place. Unit 5-Students will learn to evaluate creativity for their professional innovation and critical thinking for their competence.
SEM III	**Thermodynamics**	**KME301**	After completing this course, the students will be able to apply energy balance to systems and control volumes, in situations involving heat and work interactions. Students can evaluate changes in thermodynamic properties of substances. The students will be able to evaluate the performance of energy conversion devices. The students will be able to differentiate between high grade and low-grade energies
	Fluid Mechanics & Fluid Machines	**KME302**	Upon completion of this course, students will be able to mathematically analyze simple flow situations. They will be able to evaluate the performance of pumps and turbines
	Materials Engineering	**KME303**	Student will be able to identify crystal structures for various materials and understand thedefects in such structures. Understand how to tailor material properties of ferrous and non-ferrous alloys. How to quantify mechanical integrity and failure in materials.
SEM IV	**Applied Thermodynamics**	**KME401**	After completing this course, the students will get a good understanding of various practical power cycles and heat pump cycles. They will be able to analyze energy conversion in various thermal devices such as combustors, air coolers, nozzles, diffusers, steam turbines and reciprocating compressors. They will be able to understand phenomena occurring in high speed compressible flows
	Engineering Mechanics	**KME402**	After completing this course, the students should be able to understand the various effect of force and motion on the engineering design structures
	Manufacturing Processes	**KME403**	Upon completion of this course, students will be able to understand the different conventionaland unconventional manufacturing methods employed for making different products.

Heat and Mass Transfer	**KME 501**	CO-1 Understand the fundamentals of heat and mass transfer. K2 CO-2 Apply the concept of steady and transient heat conduction. K3 CO-3 Apply the concept of thermal behavior of fins. K3 CO-4 Apply the concept of forced and free convection. K3 CO-5 Apply the concept of radiation for black and non-black bodies. K3 CO-6 Conduct thermal analysis of heat exchangers. K4
Strength of Material	**KME 502**	CO 1 Understand the concept of stress and strain under different conditions of loading K2 CO 2 Determine the principal stresses and strains in structural members K3 CO 3 Determine the stresses and strains in the members subjected to axial, bending and torsional loads K3 CO 4 Apply the concepts of stresses and strain in solving problems related to springs, column and pressure vessels K3 CO 5 Calculate the slope, deflection and buckling of loaded members K3 CO 6 Analyze the stresses developed in straight and curved beams of different cross sections K4
Industrial Engineering	**KME 503**	CO1 Understand the concept of production system, productivity, facility and process planning in various industries K2 CO2 Apply the various forecasting and project management techniques K3 CO3 Apply the concept of break-even analysis, inventory control and resource utilization using queuing theory K3 CO4 Apply principles of work study and ergonomics for design of work systems K3 CO5 Formulate mathematical models for optimal solution of industrial problems using linear programming approach K
Computer Integrated Manufacturing	**KME 051**	CO 1 Understand the basic concepts of automation, computer numeric control machining K2 CO 2 Understand the algorithms of line generation, circle generation, transformation, curve, surface modeling and solid modeling K2 CO 3 Understand group technology, computer aided process planning, flexible manufacturing, Industry 4.0, robotics K2 CO 4 Understand information system and material handling in CIM environment, rapid prototyping K2 CO 5 Apply the algorithms of line & circle generation and geometric transformations K3 CO6 Develop CNC program for simple operations K3

SEM V	**Mechatronics Systems**	**KME 052**	CO 1 Identify key elements of mechatronics and its representation by block diagram. K 2 CO 2 Understand the concept of sensors and use of interfacing systems. K 2 CO 3 Understand the concept and applications of different actuators K 2 CO 4 Illustrate various applications of mechatronic systems. K 2 CO 5 Develop PLC ladder programming and implementation in real life problem. K 5
	Finite Element Methods	**KME 053**	CO 1 Understand the basic concepts of FEM and its applications. K2 CO 2 Apply the procedure involved to solve a problem using Finite Element Methods. K3 CO 3 Develop the element stiffness matrices using different approach. K3 CO 4 Analyze 1D and 2D problem using different methods. K4 CO 5 Analyze the complex geometric problems through FEM software packages. K4
	I C Engine Fuel and Lubrication	**KME 054**	CO 1 Explain the working principle, performance parameters and testing of IC Engine. K 2 CO 2 Understand the combustion phenomena in SI and CI engines and factors influencing combustion chamber design. K 2 CO 3 Understand the essential systems of IC engine and latest trends and developments in IC Engines. K 2 CO 4 Understand the effect of engine emissions on environment and human health and methods of reducing it. K 2 CO 5 Apply the concepts of thermodynamics to air standard cycle in IC Engines K 3 CO 6 Analyze the effect of various operating parameters on IC engine performance. K 4
	Advance welding	**KME 055**	CO 1 Understand the physics of arc welding process and various operating characteristics of welding power source. K2 CO 2 Analyse various welding processes and their applications. K3 CO 3 Apply the knowledge of welding for repair & maintenance, along with the weldability of different materials. K3 CO 4 Apply the concept of quality control and testing of weldments in industrial environment. K3 CO 5 Evaluate heat flow in welding and physical metallurgy of weldments. K4
	Programming, Data Structures and Algorithms Using Python	**KME 056**	CO 1 Understand the numbers, math's function, strings, list, tuples, and dictionaries in pythons K2 CO 2 Apply conditional statement and functions in python K3 CO 3 Apply file handling techniques in python K3 CO 4 Analyze the graphical demonstration in python K4 CO 5 Apply techniques of Classes and Object Concept in Python K3

	Mechanical Vibrations	**KME 057**	CO 1 Understand fundamentals of mechanical vibrations along with their classification. K2 CO 2 Differentiate among single, two and multiple degree of freedom (DOF) systems. K3 CO 3 Analyze, predict and measure the performance of systems undergoing single, two and multiple DOF. K4 CO 4 Design systems with optimized vibration absorption capabilities. K4 CO 5 Apply the fundamentals to the real life problems like whirling of shaft K3 CO 6 Solve complicated mathematical models using Numerical methods and software applications. K4
	Fuels and Combustion	**KME 058**	CO1 Understand the properties of different types of fuel with their application. K2 CO2 Classify different types of fuels. K2 CO3 Understand the concept of combustion. K2 CO4 Understand the fundamental concept of air pollution and its control. K2 CO5 Calculate various properties of the fuels. K3 CO6 Analyze the flue gases. K4
	Refrigeration and Air Conditioning	**KME 601**	CO1 Understand the properties of different types of fuel with their application. K2 CO2 Classify different types of fuels. K2 CO3 Understand the concept of combustion. K2 CO4 Understand the fundamental concept of air pollution and its control. K2 CO5 Calculate various properties of the fuels. K3 CO6 Analyze the flue gases. K4
	Machine Design	**KME 602**	CO 1 Recall the basic concepts of Solid Mechanics to understand the subject. K2 CO 2 Classify various machine elements based on their functions and applications. K2 CO 3 Apply the principles of solid mechanics to machine elements subjected to static and fluctuating loads. K3 CO 4 Analyze forces, bending moments, twisting moments and failure causes in various machine elements to be designed. K4 CO 5 Design the machine elements to meet the required specification. K5

SEM VI	**Theory of Machines**	**KME 603**	CO1 Understand the principles of kinematics and dynamics of machines. K2 CO2 Calculate the velocity and acceleration for 4-bar and slider crank mechanism K3 CO3 Develop cam profile for followers executing various types of motions K3 CO4 Apply the concept of gear, gear train and flywheel for power transmission K3 CO5 Apply dynamic force analysis for slider crank mechanism and balance rotating & reciprocating masses in machines. K3 CO6 Apply the concepts of gyroscope, governors in fluctuation of load and brake & dynamometer in power transmission K3
	Nondestructive Testing	**KME 061**	CO 1 Understand the concept of destructive and Non-destructive testing methods. K2 CO 2 Explain the working principle and application of die penetrant test and magnetic particle inspection. K2 CO3 Understand the working principle of eddy current inspection. K2 CO 4 Apply radiographic techniques for testing. K3 CO 5 Apply the principle of Ultrasonic testing and applications in medical and engineering areas. K3
	Artificial Intelligence	**KME 062**	CO 1 Understand concepts of Artificial Intelligence K2 CO 2 Solve problem by Search-I & Search-II K3 CO 3 Understand Knowledge representation K2 CO 4 Apply concepts of Learning methods K3 CO 5 Analyse Decision Networks K4 CO 6 Build planning graphs K5
	Tribology	**KME 063**	CO 1 Identify and explain various friction and wear mechanisms. K2 CO 2 Select proper lubricants for different applications. K3 CO 3 Select suitable lubrication methods in different bearings. K3 CO 4 Study the surfaces coating techniques for reduction of wear. K3 CO 5 Analyze the impact of friction in various kinematic pairs. K4
	Gas Dynamics and Jet Propulsion	**KME 064**	CO1 Understand the concept of compressible fluid flow and flow through variable area ducts. K2 CO2 Understand the basic principle and types of jet and rocket propulsion. K2 CO3 Apply the basic laws for the investigation of flow through ducts. K3 CO4 Apply the basic laws for the thermodynamics analysis of jet and rocket propulsion. K3 CO5 Analyze the compressible flow through variable area ducts. K4

SEM VII	**COMPUTER AIDED DESIGN**	**RME701**	CO1 Identify proper computer graphics techniques for geometric modelling. Describe and understand the fundamental theory and concepts of the CAD/CAM and to gain knowledge about the benefits of CAD and graphics standards. CO2 Transform, manipulate objects & store and manage data, Build up the knowledge of the underlying theory of modeling and the usage of models in different engineering applications CO3 CAM Tool path Creation and NC- G code output.,Compare the different types of modeling techniques and create transformations for 2D geometric modeling and also to understand the basics of Finite Element Methods in the context of modelling. CO4 Use rapid prototyping and tooling concepts in any real life applications, Recognize and analyze Computer Aided Designing systems; Geometric modeling, solid modeling, and feature-based design modeling CO5 Identify the tools for Analysis of a complex engineering component
	AUTOMOBILE ENGINEERING	**RME702**	CO1 Be able to understand the application of automobile and frame, Chassis, Tractive force & gearbox Problem with solution. CO2 Be able to design & application of Transmission system and Assignment problems using appropriate method CO3 Be able to understand the application of braking system & the use of chassis & suspension system in the automobile using different mechanical & electronic components. CO4 Be able to solve simple problems of electrical & fuel supply system in practical cases making under different automobile conditions . CO5 Enables to take best course of action out of several alternative courses for the purpose of achieving objectives by using emission standards and pollution control & alternative energy sources.
	POWER PLANT ENGINEERING	**RME 071**	CO1 Understand the different sources of power generation and their impact on environment. CO2 Understand the elements of power generation using fossil fuels. CO3 Understand the elements of power generation using nuclear and renewable energy sources. CO4 Understand the concepts of electrical systems used in power plants CO5 Apply the basic concepts of thermodynamics to measure the performance of different power plants. CO6 Determine the performance of power plants based on load variations.

	OPERATION RESEARCH	**RME 075**	CO1 Be able to understand the application of OR and frame a LP Problem with solution – graphical. CO2 Be able to build and solve Transportation and Assignment problems using appropriate method CO3 Be able to design and solve simple models of CPM and queuing to improve decision making and develop critical thinking and objective analysis of decisionproblems CO4 Be able to solve simple problems of replacement and implement practical cases of decision making under different business environments . CO5 Enables to take best course of action out of several alternative courses for the purpose of achieving objectives by applying game theory and sequencing models
	UNDERSTANDING OF HUMAN BEING	**ROE 074**	CO1 To help the students having the clarity about human aspirations, goal, activities and purpose of life. CO2 To facilitate the competence to understand the harmony in nature/existence and participation of human being in the nature/existence. CO3 To help the students to develop the understanding of human tradition and its various components.
SEM VIII	**RENEWABLE ENERGY RESOURCES**	**ROE 086**	resources. In Comparison with various conventional energy systems, their prospects and limitations CO2 Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation CO3 Explore the concepts involved in wind energy conversionsystem by studying its components, types and performance. CO4 Illustrate ocean energy and explain the
	NON DESTRUCTIVE TESTING	**RME 080**	common terminology flaws 7 defects advantage & limitation of visual inspection Problem with solution. CO2 Be able to understand the different technique of non destructive testing like dye penetration test & magnetic particle inspection for determining the defects in different manufacturing process. CO3 Be able to understand the different technique of non destructive testing like Radiographic methods for determining the defects in different manufacturing process. CO4 Be able to understand the different technique of non destructive

	TOTAL QUALITY MANAGEMENT	**RME085**	CO1 To understand the concept of Quality CO2 To understand the Implication of Quality on Business CO3 To Implement Quality Implementation Programs CO4 To have exposure to challenges in Quality Improvement Programs CO5 Identify requirements of quality improvement programs