PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2019-20)

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
	PHYSICS	**KAS101**	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
	CHEMISTRY	**KAS102**	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.
	MATHEMATICS -1	**KAS103**	1. Remember the concept of matrices and apply for solving linear simultaneous equations. 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 . 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians

SEM I	**ELECTRICAL ENGINEERING**	**KEE101**	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.
	PROGRAMMING FOR PROBLEM SOLVING	**KCS101**	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
	ENGINEERING GRAPHICS AND DESIGN	**KCE101**	design 2: Understanding of engineering graphics standards and solid modelling 3: Effective communication through graphics 4: Applying modern engineering tools necessary for engineering practice 5: Appling computer-aided geometric design
	WORKSHOP PRACTICES	**KWS101**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice
	PHYSICS	**KAS201**	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
	CHEMISTRY	**KAS202**	1. Get an understanding of the theoretical principles understanding molecular structure, bonding and properties. 2. Know the fundamental concepts of determination of structure with various techniques. 3. Know the fundamental concepts of chemistry applicable in industrial processes.

SEM II	**MATHEMATICS -II**	**KAS203**	1. Understand the concept of differentiation and apply for solving differential equations. 2. Remember the concept of definite integral and apply for evaluating surface areas and volumes. 3. Understand the concept of convergence of sequence and series. Also evaluate Fourier series 4. Illustrate the working methods of complex functions and apply for finding analytic functions. 5. Apply the complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.
	ELECTRICAL ENGINEERING	**KEE201**	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
	PROGRAMMING FOR PROBLEM SOLVING	**KCS201**	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.
	ENGINEERING GRAPHICS AND DESIGN	**KCE201**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 3: Effective communication through graphics 4: Applying modern engineering tools necessary for engineering practice 5: Appling computer-aided geometric design

WORKSHOP PRACTICES	**KWS201**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice Text
PROFFESIONAL ENGLISH	**KAS204**	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 & error-free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & 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 inter-personal communication skills and positive attitude leading to their professional 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
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

SEM III	**SURVEYING AND GEOMATICS LAB**	**KCE352**	1. To measure bearings of a closed traverse by prismatic compass and to adjust the traverse by 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**	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 ship model. 12. To determine the head loss for a sudden enlargement, sudden contraction and losses in bend. 13. Flow Visualization -Ideal Flow 14. To make studies in Wind Tunnel (Aerofoil and circular cylinder).

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.
	SOCIOLOGY	**RAS 502**	On completion of this course a successful candidate will 1 To study and understand about the Industrial Sociology. 2 To study and analyze concept of Rise and Development of Industry. 3 To study and learn about Industrialization in India. Industrial Policy Resolutions. 4 To study and learning of Contemporary Issues: grievances and Grievance handling Procedure. 5 Study and learning of concept of Visualizing the future: Models of industrialization

SEM V	**Concrete Technology**	**RCE 052**	On completion of this course a successful candidate will 1 To study and understand about the Concrete and its compositions. 2 To study and analyze different types of Elements of the concrete and related properties. 3 To study and learn about the Mix design concept of the concrete. 4 To study and learning of different properties of the concrete & compositions. 5 Study and learning of concept of different types of concrete.
	Managerial Economics	**RAS 501**	On completion of this course a successful candidate will 1 To study and understand about the Introduction of Engineering Economics and Demand Analysis. 2 To study and analyze concept of supply and forecasting. 3 To study and learn about cost analysis. 4 To study and learning of Market Structure. 5 Study and learning of concept of Nature and characteristics of Indian economy, concepts of LPG, elementary concepts of National Income, Inflation and Business Cycles
	Quantity Estimation & Management	**RCE 503**	On completion of this course a successful candidate will 1 To study and understand about the different types of Estimations and Measurement Units. 2 To study and analyze different types of Contract and Tenders, along with specifications and rate analysis for various quantities. 3 To study and learn about various Elements of Management & Network Techniques. 4 To study and learning of Equipment Management and their usage & Productivity in the construction process. 5 Study and learning of concept of Project Cost Management and related elements.

	Geotechnical Engineering	**RCE 501**	On completion of this course a successful candidate will 1 To study and understand about the concept of soil and its compositions, about Geotechnical engineering & requirement, importance and engineering properties of the soil. 2 To study and understand the concept of soil hydraulics relations, theories, stress and pressure analysis in the soil along with various effects. 3 To study and learn about the concept compaction in soil, consolidation in soil, factors controlling compaction and consolidation in soil. 4 To study and learning of shear strength in soil, methods and various theories to control straining in soil, various tests to calculate strength in the soil along with the concept of earth and pore pressure in the soil. 5 Study and learning of concept of bearing capacity of the soil, foundation and its type, classification of foundation.
	Design Of Structure I	**RCE 502**	On completion of this course a successful candidate will 1 Understand the concepts and analysis of fixed and continuous beams. 2 Draw influence line diagrams for indeterminate beams and analyze two and three hinged arches. 3 Study and analyze suspension bridges and girders. 4 Analyze beams, frames and trusses by basic force and displacement matrix method. 5 Understand the basic principles of plastic analysis of beams and frames.
	Industrial Management	**RAS 601**	On completion of this course a successful candidate will 1 To study and understand about the Introduction: Concept and scope of Industrial Management. 2 To study and analyze Functions of Management. 3 To study and learn about the Work Study: Introduction, definition, objectives, steps in work study, Method study. 4 To study and learning of Quality Control. 5 Study and learning of concept of Project Management

	Cyber Security	**RUC 601**	On completion of this course a successful candidate will 1 Evaluate the need of cyber security and information systems 2 Understand the need of application systems and assess the threats 3 Develop secure information system, CCTV and intrusion detection system. 4 Review security policies and evolving technology security 5 Have a know-how of information security systems and different laws prevalent to control cyber threats and cyber abuse
	Design Of Structure II	**RCE 601**	On completion of this course a successful candidate will 1 To study and understand about the Concrete and its compositions. 2 To study and analyze different types of Elements of the concrete and related properties. 3 To study and learn about the Mix design concept of the concrete. 4 To study and learning of different properties of the concrete & compositions. 5 Study and learning of concept of different types of concrete.
SEMVI	**Environmental Engineering**	**RCE602**	On completion of this course a successful candidate will 1 To study and understand about the concept of demand and supply of water system. 2 To study and analyze Storage and distribution of water. 3 To study and learn about the Physical, chemical and bacteriological examination of water and wastewater. 4 To study and learning Objectives of water treatment: unit operations, processes, and flow sheets of different properties of the concrete & compositions. 5 Study and learning of Objectives of waste water treatment: unit Operations, processes, and flow sheets. Secondary and tertiary treatment

	Transportation Engineering	**RCE 603**	On completion of this course a successful candidate will 1 To study and understand about the Introduction: Role of Transportation, Modes of Transportation 2 To study and analyze Geometric Design (IRC: 73-Latest revision). 3 To study and learn about the Traffic Engineering: Traffic Characteristics. 4 To study and learning of Highway Materials: Properties of Sub-grade, Aggregates & Binding materials, Various tests and specifications, 5 Study and learning of Highway Construction.
	Integrated Waste Management For A Smart City	**REC 062**	On completion of this course a successful candidate will 1 Understand the concepts of solid waste management and the idea of swachh bharat mission. 2 Understand the composition of municipal solid waste and the system involved in its processing. 3 Explain the process of municipal solid waste management. 4 Ascertain the beneficial uses of waste recovery. 5 Understand E- Waste and hazardous waste disposal and assess the risks involved in handling.
	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) (2019-20)

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
	PHYSICS	**KAS101**	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
	CHEMISTRY	**KAS102**	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.
	MATHEMATICS -1	**KAS103**	1. Remember the concept of matrices and apply for solving linear simultaneous equations. 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 . 3. Identify the application of partial differentiation and apply

			for evaluating maxima, minima, series and Jacobians. 4. Illustrate the working methods of multiple integral and apply for finding area, volume, centre of mass and centre of gravity. 5. Remember the concepts of vector analysis for application
SEM I	**ELECTRICAL ENGINE**	**KEE101**	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.
	PROGRAMMING FOR	**KCS101**	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.
	ENGINEERING GRAPH	**KCE101**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 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
	WORKSHOP PRACTIC	**KWS101**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice
	PHYSICS	**KAS201**	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
	CHEMISTRY	**KAS202**	1. Get an understanding of the theoretical principles understanding molecular structure, bonding and properties. 2. Know the fundamental concepts of determination of structure with various techniques. 3. Know the fundamental concepts of chemistry applicable in industrial processes.
	MATHEMATICS -II	**KAS203**	1. Understand the concept of differentiation and apply for solving differential equations. 2. Remember the concept of definite integral and apply for evaluating surface areas and volumes. 3. Understand the concept of convergence of sequence and series. Also evaluate Fourier series 4. Illustrate the working methods of complex functions and apply for finding analytic functions. 5. Apply the complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.
	ELECTRICAL ENGINE	**KEE201**	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
SEMII	**PROGRAMMING FOR**	**KCS201**	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.

ENGINEERING GRAPH	**KCE201**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 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
WORKSHOP PRACTIC	**KWS201**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice Text
PROFFESIONAL ENGL	**KAS204**	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 & error-free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & 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 inter-personal communication skills and positive attitude leading to their professional competence.

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. Understanding the concept of recursion, application of recursion and its implementation and removal of recursion. Identify the alternative implementations of data structures with respect to its performance to solve a real world problem.
	Computer Organization	**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 system, cache memories and virtual memory K2 CO 5 Understanding the different ways of communicating with I/O devices and standard I/O interfaces
	Discrete Structures & Th	**KCS303**	CO 1 Write an argument using logical notation 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. CO 4 Demonstrate different traversal methods for trees and graphs. K1, K4 CO 5 Model problems in Computer Science using graphs and trees. K2, K6
	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 and Deadlocks K2 CO 4 Learn various memory management scheme K2 CO 5 Study I/O management and File systems. K2,K4

SEM IV	**Theory of Automata and**	**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, and complexity through problem solving K1, K5 CO 4 Prove the basic results of the Theory of Computation. K2,K3 CO 5 State and explain the relevance of the Church-Turing thesis. K1, K5
	Microprocessor	**KCS403**	CO 1 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. K3 CO 4 Analyze the properties of Microprocessors(8085/8086) K4 CO 5 Evaluate the data transfer information through serial & parallel ports. K5
	Manegerial Economics	**RAS501**	1. Understand the roles of managers in firms 2. Understand the internal and external decisions to be made by managers 3. Analyze the demand and supply conditions and assess the position of a company 4. Design competition strategies, including costing, pricing, product differentiation, and market environment according to the natures of products and the structures of the markets. 5. Analyze real-world business problems with a systematic theoretical framework. 6. Make optimal business decisions by integrating the concepts of economics, mathematics and statistics.

SEMV	**Cyber Security**	**RUC501**	1. Understanding of the concepts and foundations of computer security, and identify vulnerabilities of IT systems. 2. The basic security threats that effect system security and can develop basic security enhancements in stand-alone applications. E-commerce and digital transactions. 3. The basic methods to tackle various types of intrusions on your system. 4. Understand policies related to web or cyber. 5. Understand of laws related to cyber and information.
	Database Management S	**RCS-501**	1. Describe the fundamental elements of relational database management systems 2. Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL. 3. Design ER-models to represent simple database application scenarios 4. Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data. 5. Improve the database design by normalization. 6. Familiar with basic database storage structures and access techniques: file and page organizations, indexing methods including B tree, and hashing.
	Design and Analysis of A	**RCS-502**	1. Ability to analyze the performance of algorithms. 2. Ability to choose appropriate algorithm design techniques for solving problems. 3. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs. 4. To clear up troubles the usage of set of rules design methods including the grasping approach, divide and overcome, dynamic programming, backtracking and department and certain. 5. To understand the variations among tractable and intractable problems. 6. To introduce p and np classes
	Principles of Programm	**RCS-503**	1. Understanding the basic of what is programming languages, why they are used and related models. 2. Learn the concepts of programming languages that are used in it , data and statements and its uses. 3. Understanding the types of programs and their implementation. 4. To learn about the OOPs Concepts with the help of any programming language examples. 5. Understand and try to work with the logics of programming and related programming language.

	Web Technologies	**RCS 052**	1. Students are able to develop a dynamic webpage by the use of java script and DHTML. 2. Students will be able to write a well formed / valid XML document. 3. Students will be able to connect a java program to a DBMS and perform insert, update and delete operations on DBMS table. 4. Students will be able to write a server side java application called Servlet to catch form data sent from client, process it and store it on database. 5. Students will be able to write a server side java application called JSP to catch form data sent from client and store it on database
	Industrial Management	**RAS 601**	1. The students get employed in jobs, related to Production Planning section, Industrial Engineering Department, Shop floor, Assembly lines, in all sectors like IT, Banking , Manufacturing, Share Market, Higher Education, Sports, where they can implement their statistical knowledge 2. This subject also helps a student to be a self-employable by getting knowledge of management techniques. 3. Statistical Knowledge enhances chances to get a certification from worldwide famous organization like ASQ. i.e. American Society for Quality 4. Student will demonstrate Commitment to quality, timeliness, and continuous improvement in production rate in manufacturing sector 5. Students also show the ability to formulate, conduct, analyze and interpret experiments and apply experimental results to improve processes in industry
	Industrial Sociology	**RUC 601**	1. Definition of industry, meaning, pre-industrial, industrial society and its system. 2. Work in modern society. 3. Meaning and trends of Industrial disputes in India. 4. Labour welfare. 5. Industry and society

SEM VI	**Computer Networks**	**RCS 601**	1. Have a good understanding of the OSI Reference Model and in particular have a good 2. Analyze the requirements for a given organizational structure and select the most appropriate networking architecture and technologies. 3. Have a basic knowledge of the use of cryptography and network security. 4. Specify and identify deficiencies in existing protocols, and then go onto formulate new and better protocols. 5. Have an understanding of the issues surrounding Mobile and Wireless Networks. 6. Have a working knowledge of datagram and internet socket programming
	Compiler Design	**RCS 602**	1. To realize basics of compiler design and apply for real time applications. 2. To introduce different translation languages 3. To understand the importance of code optimization 4. To know about compiler generation tools and techniques 5. To learn working of compiler and non compiler applications 6. Design a compiler for a simple programming language
	Computer Graphics	**RCS 603**	1. Understand the basic concepts of Computer Graphics. 2. Demonstrate various algorithms for scan conversion and filling of basic objects and their comparative analysis. 3. Apply geometric transformations, viewing and clipping on graphical objects. 4. Explore solid model representation techniques and projections. 5. Understand visible surface detection techniques and illumination models
	Data warehousing & Dat	**RCS 604**	1. Understand the functionality of the various data mining and data warehousing component. 2. Appreciate the strengths and limitations of various data mining and data warehousing models. 3. Explain the analyzing techniques of various data. 4. Describe different methodologies used in data mining and data ware housing. 5. Compare different approaches of data ware housing and data mining with various technologies

SEM VII	**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. ➢ To know about Shared Memory Techniques. ➢ Have sufficient knowledge about file access. ➢ Have knowledge of Synchronization and Deadlock.
	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 require problem solving, inference, perception, knowledge representation, and learning ➢ Demonstrate proficiency in applying scientific method to models of machine learning. ➢ Discuss different optimizations techniques.
	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 and their limitations ➢ Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications ➢ Reveal different applications of these models to solve engineering and other problems

	CloudComputing	**RCS075**	➢ Articulate the main concepts, key 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 and security. ➢ To appreciate the emergence of cloud as the next generation computing paradigm
SEM VIII	**ImageProcessing**	**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. ➢ Detect a moving object in video using the concept of motion analysis. ➢ Recognize the object using the concept of computer vision
	MachineLearning	**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 learning ➢ To design appropriate machine learning algorithms for problem solving ➢ To understand the need for machine learning for various problem solvin
	DataCompression	**RCS087**	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 technique for Image

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2019-20)

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.
10. Communication:

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	PHYSICS	**KAS101**	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
	CHEMISTRY	**KAS102**	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.
	MATHEMATICS -1	**KAS103**	1. Remember the concept of matrices and apply for solving linear simultaneous equations. 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 . 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. 4. Illustrate the working methods of multiple
SEM I	**ELECTRICAL ENGINEERING**	**KEE101**	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.
	PROGRAMMING FOR PROBLEM SOLVING	**KCS101**	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.
	ENGINEERING GRAPHICS AND DESIGN	**KCE101**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 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

	WORKSHOP PRACTICES	**KWS101**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice
	PHYSICS	**KAS201**	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
	CHEMISTRY	**KAS202**	1. Get an understanding of the theoretical principles understanding molecular structure, bonding and properties. 2. Know the fundamental concepts of determination of structure with various techniques. 3. Know the fundamental concepts of chemistry applicable in industrial processes.
	MATHEMATICS -II	**KAS203**	1. Understand the concept of differentiation and apply for solving differential equations. 2. Remember the concept of definite integral and apply for evaluating surface areas and volumes. 3. Understand the concept of convergence of sequence and series. Also evaluate Fourier series 4. Illustrate the working methods of complex functions and apply for finding analytic functions. 5. Apply the complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.

SEM II	**ELECTRICAL ENGINEERING**	**KEE201**	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
	PROGRAMMING FOR PROBLEM SOLVING	**KCS201**	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.
	ENGINEERING GRAPHICS AND DESIGN	**KCE201**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 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
	WORKSHOP PRACTICES	**KWS201**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice Text

	PROFFESIONAL ENGLISH	**KAS204**	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 & error-free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & 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 inter-personal communication skills and positive attitude leading to their professional competence.
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 and design resistors. 4. Utilize the mathematical models of MOS transistors for circuits and systems. 5. Analyse and find application of special purpose diodes
	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 4. Analyze various logic families. 5. Design ADC and DAC and implement in amplifier, integrator, etc.

	Network Analysis and Synthesis	**KEC303**	1. Understand basics electrical circuits with nodal and mesh analysis. 2. Appreciate electrical network theorems. 3. Apply Laplace transform for steady state and transient analysis. 4. Determine different network functions. 5. Appreciate the frequency domain techniques
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 their system performance.
	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. 4. Understand the functioning of OP-AMP and design OP-AMP based circuits. 5. Design LPF, HPF, BPF, BSF.
	Signal System	**KEC403**	1. Analyze different types of signals. 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.
	Advanced Semiconductor Devices	**REC-055**	1. Acquire basic knowledge on the working of various semi-conductor devices 2. Develop analysis capability in BJT and FET Amplifier Circuits 3. Acquire basic knowledge on the working of various semi-conductor diodes. 4. Acquire basic knowledge on the working of various semi-conductor power devices 5. Acquire basic knowledge on the working of various semi-conductor photonic devices

SEM V	**Integrated Circuit**	**REC-501**	1. To understand the basic concepts of analog ICs and related circuits 2. To understand the basic concepts of digital ICs and related circuits 3. To analyze analog and digital circuits 4. To design OP-AMP based analog linear integrated circuits 5. To design OP-AMP based analog non-linear integrated circuits 6. To analyze CMOS based digital integrated circuits 7. To analyze Phase locked loop
	Principle of Communication	**REC-502**	1. To develop the understanding of basic concepts and terminologies of communication systems 2. To understand the frequency domain & time domain representation of different signals and systems 3. To analyse various schemes of analog communication systems (modulation and demodulation) 4. To examine the different steps of waveform coding and decoding techniques 5. To apply the concepts of multiplexing techniques in TDM hierarchy 6. To visualize different types & characterises of noise 7. To examine the performance of different analog communication systems in noisy environment
	Digital Signal Processing	**REC-503**	1. To understand the basic concepts and terminologies of digital signal processing and filter design 2. To apply different transformation tools for the analysis of discrete time signals and systems 3. To apply basic concepts of digital signal processing in the design of different filters 4. To analyze different filters for digital signal processing 5. To synthesize different filter structures on the basic of different realization methods 6. To apply concepts of multivariate signal processing

	Cyber Security	**RUC-501**	6. Understanding of the concepts and foundations of computer security, and identify vulnerabilities of IT systems. 7. The basic security tools to enhance system security and can develop basic security enhancements in stand-alone applications. 8. Understand cyber laws. 9. Understand E-Commerce and digital transactions. 10. The basic methods to tackle various types of intrusions on your system.
	Managerial Economics	**RAS-501**	1. Understand the structure and functioning of the major financial institutions 2. Analyze and evaluate the New Economic Policies of the Government of India 3. Get an orientation to Indian Public Finance 4. Understand the fundamentals of National Income Analysis 5. Analyze the problems of inflation and BOP and suggest measures to control them. 6. Have an understanding of the major issues in International Economics
	Microwave Engineering	**REC-601**	1. To understand the concepts of microwave guiding mediums 2. To understand the concepts of microwave passive devices and their performance parameters 3. To understand the concepts of microwave active devices and their performance parameters 4. To understand the microwave generating devices, their characteristics and applications 5. To understand the general setup of microwave test bench 6. To analyze the performance of microwave devices 7. To measure different parameters on microwave test bench

	Digital Communication	**REC-602**	1. To understand issues related to digital transmission and reception in modulation format digital communication systems 2. To analyze different line coding schemes and corresponding improvement techniques and also analyze different coding schemes to design optimum receiver for channel with ISI. 3. To apply fundamentals of probability theory and random process in solving different problems 4. To apply vector decomposition concept in signal and noise 5. To analyze the performance of digital communication system in noisy environment 6. To analyze spread spectrum technology in single and multi user environment 7. To understand different concepts of information theory and coding 8. To apply source coding techniques in different digital communication systems 9. To apply channel coding techniques in different digital communication systems
SEM VI	**Microcontroller for Embedded Systems**	**REC-062**	1. Explain the Microcontroller's internal architecture and its operation within the area of manufacturing and performance. 2. Apply knowledge and demonstrate programming proficiency using the various addressing modes and data transfer instructions of the target microcontroller. 3. Compare accepted standards and guidelines to select appropriate Microcontroller to meet specified performance requirements 4. Design various microcontroller based system to solve environmental & society issue. 5. Understand the knowledge of various technology (Bluetooth, IOT etc.) used in Industry.

Control System I	**RIC-603**	1. To understand basic concepts of a control system 2. To develop the mathematical model of various physical systems 3. To determine Transfer function and sensitivity of a complex physical system using block diagram reduction and signal flow graph method 4. To carry out the time domain analysis of first and second order systems. 5. To determine different parameters concerning stability of a system 6. To evaluate the stability of linear control systems using Routh Hurwitz Criteria and Root Locus Technique. To determine the range of value of K(gain) for the system to be stable 7. To evaluate the stability of linear control systems using different frequency domain techniques like Nyquist criteria and Bode plots. To determine the stability we find gain margin, Phase margin 8. To examine controllability and observing ability of various systems using state variable technique.
Sociology	**RAS-602**	1. Understand the Nature and Scope of Industrial sociology and with Characteristics of the factory system and Work Environment 2. Identify the role of Motivation and Job satisfaction, stress management. Organizational culture, Leadership & group dynamics 3. Identify and employ various research designs and their appropriate application to the study of social life, Performance Management, Training & Development 4. An understanding of the need for high ethical standards in the practice of engineering, including the responsibilities of the engineering profession towards people and the environment. 5. Understand the need for personnel and techniques for training and development for good personnel
Industrial Management	**RAS-601**	1. Choose the appropriate design of product 2. Describe production forecasting 3. Select appropriate work study and recognize appropriate work measurement 4. List necessary tools, equipments and exercise proper inventory control 5. Draw a production , planning and schedule

	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. CO3 Realize protocols at different layers of a network hierarchy CO4 Recognize security issues 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 CMOS circuit. CO4 Analyse SRAM cell and memory arrays
	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 assignment problems, Dimensioning Wavelength Routing Networks, Network Survivability. CO5 To gain knowledge of working of OTDM, Synchronization, Header Processing, Buffering, Burst Switching, Deployment Considerations-SONET/SDH core Network.

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-check codes, Product codes, Repetition codes, Hamming codes CO5 Design Generator matrices for convolutional codes, Generator polynomials for convolutional codes
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 restoration techniques. CO4 Compare the image compression techniques in spatial and frequency domains. CO5 Select feature extraction techniques for image analysis and recognition

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, Bode plots and Root Locus techniques. CO4 Learn, apply, and investigate Matlab applications in neural networks and fuzzy logic. CO5 Learn, apply, and investigate Matlab applications in digital signal processing including multi-rate DSP algorithms
	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 well as receiver and their comparative study CO5 To get idea about power budget and ultimately be an engineer with adequate knowledge in optical domain
	Filter Design	**REC076**	CO1 Choose an appropriate transform for the given signal. CO2 Choose appropriate decimation and interpolation factors for high performance filters. CO3 Model and design an AR system. CO4 Implement filter algorithms on a given DSP processor platform.

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, and Restricted DSW Algorithm and their comparison, Classical Predicate Logic; Fuzzy Logic. CO5 Understand Fundamental Issues in Control Engineering, Control Design Process, Semiformal Aspects of Design Process, Mamdani
Computerized Process Control	**REC078**	CO1 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, Adaptive Control, Inferential control, Intelligent Control, Statistical control. CO5 Design Electric Oven Temperature Control, Reheat Furnace Temperature 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 modes, e.g. packet and circuit switching. CO4 Understand the principles of the internal design and operation of telecommunication switches, and the essence of the key signalling systems that are used in telecommunication networks.
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 operation, Type of Mass Spectrometers, components of Mass Spectrometers, inductively coupled plasma-mass spectrometer. CO5 Understand the Principle of NMR, types of NMR spectrometers, constructional details of NMR spectrometer

SEM VIII	**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 Based Displays, 3-D Displays, 3-D Cinema Technology, Autostereoscopic 3-D Technology CO5 Understand Liquid Crystals on Silicon Reflective Micro-display, Trans missive Liquid Crystal Micro-display, MEMs Micro-display, DLP Projection Technology.
	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 satellite communication link. CO5 Specify, design, prototype and test analog and digital satellite communication systems as per given specifications.

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. CO5 Gain knowledge of IS-95 CDMA mobile communication standard, its architecture, logical channels, advantages and limitations. CO6 Gain knowledge of 3G mobile standards and their comparison with 2G technologies
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 management. CO5 Evaluate the quality of service that need for QoS.
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 Homomorphic processing. CO5 Understand basic principles of linear predictive analysis, the autocorrelation method, computation of the gain for the model, solution of LPC equations.

	Micro and Smart Systems	**REC088**	CO1 Understand the Why miniaturization?, 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 of beams CO5 Understand integration of Microsystems and microelectronics, microsystems packaging, case studies of integrated Microsystems

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2019-20)

BTECH ELECTRICAL& ELECTRONICS

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: 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.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-

COURSE OUTCOME

SEMESTER	COURSE NAME	COURSE CODE	COURSE OUTCOME
	PHYSICS	**KAS101**	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
	CHEMISTRY	**KAS102**	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.
	MATHEMATICS -1	**KAS103**	1. Remember the concept of matrices and apply for solving linear simultaneous equations. 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 . 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. 4. Illustrate the working methods of multiple
SEM I	**ELECTRICAL ENGINEERING**	**KEE101**	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.
	PROGRAMMING FOR PROBLEM SOLVING	**KCS101**	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.
	ENGINEERING GRAPHICS AND DESIGN	**KCE101**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 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

	WORKSHOP PRACTICES	**KWS101**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice
	PHYSICS	**KAS201**	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 &
	CHEMISTRY	**KAS202**	1. Get an understanding of the theoretical principles understanding molecular structure, bonding and properties. 2. Know the fundamental concepts of determination of structure with various techniques. 3. Know the fundamental concepts of chemistry applicable in industrial processes.
	MATHEMATICS -II	**KAS203**	1. Understand the concept of differentiation and apply for solving differential equations. 2. Remember the concept of definite integral and apply for evaluating surface areas and volumes. 3. Understand the concept of convergence of sequence and series. Also evaluate Fourier series 4. Illustrate the working methods of complex functions and apply for finding analytic functions. 5. Apply the complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.

SEM II	**ELECTRICAL ENGINEERING**	**KEE201**	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
	PROGRAMMING FOR PROBLEM SOLVING	**KCS201**	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.
	ENGINEERING GRAPHICS AND DESIGN	**KCE201**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 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
	WORKSHOP PRACTICES	**KWS201**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice Text

	PROFFESIONAL ENGLISH	**KAS204**	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 & error-free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & 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 inter-personal communication skills and positive attitude leading to their professional competence.
	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, magnetization, magnetic boundary conditions and inductors. K4 CO5 Understand displacement current, time varying fields, propagation and reflection of EM waves and transmission lines. K3

SEM III	**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, frequency meter and CRO. K2 CO5 Display the knowledge of transducers, their classifications and their applications for the measurement of physical quantities like motion, force, pressure, temperature, flow and liquid level. K3
	Basic Signals & Systems	**KEE303**	CO 1 Represent the various types of signals & 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 CO4 Implement the concepts of Z transform to solve complex engineering problems using difference equations. K3
	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 with their applications. K4 CO4 Implement the Design procedure of Synchronous & Asynchronous Sequential Circuits. K3 CO5 Apply the concept of Digital Logic Families with circuit implementation. K3

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 generator. K4 CO4 Evaluate the performance of transformers, individually and in parallel operation. K4 CO5 Demonstrate and perform various connections of three phase transformers. K3
	Networks Analysis & Synthesis	**KEE403**	CO 1 Apply the knowledge of basic circuital law, 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 frequency and analyze the structure and function of one and two port network. Also evaluate and analysis two-port network parameters. K4 CO5 Synthesize one port network and analyze different filters. K4
	Managerial Economics	**RAS-501**	On completion of this course a successful candidate will 1. Choose best allocation of firm's scarce resources 2. Select best mix of available resources 3. Point towards the resource paucity of firms 4. Recognize that unused method of production which might enhance welfare of people at large. 5. Draw a wonderful plan for the firm

SEM V	**Cyber Security**	**RUC 501**	On completion of this course a successful candidate will CO1: Understanding of the concepts and foundations of computer security, and identify vulnerabilities of IT systems. CO2: The basic security tools to enhance system security and can develop basic security enhancements in stand-alone applications. CO3: Understand cyber laws. CO4: Understand E-Commerce and digital transactions. CO5: The basic methods to tackle various types of intrusions on your system.
	Electrical Machine-II	**REE501**	On completion of this course a successful candidate will 1. To impart the knowledge on fundamental of AC rotating machines. 2. To impart the knowledge on constructional details, principle of operation of three phase alternator and synchronous motor. 3. To impart the knowledge on constructional details, principle of operation, performance, starter, speed control and braking of three phase induction motor. 4. To impart the knowledge on constructional details, principle of operation, type of single phase induction motor and special machine.
	Power Transmission & Distribution	**REE502**	On completion of this course a successful candidate will 1. Ability to learn the basics of various fundamentals of electric power generation, transmission and distribution 2. Ability to learn the transmission line parameters, their calculations also the effects on transmission lines and its effects on the communication systems. 3. Ability to learn the mechanical design along with the types of insulators also knowledge of voltage distribution across the string. 4. Ability to learn the conductors and insulation, different types of underground cable parameters.

	Control System	**REE503**	On completion of this course a successful candidate will 1. Categorize different types of system and identify a set of algebraic equations to represent and model a complicated system into a more simplified form. 2. Employ time domain analysis to predict and diagnose transient performance parameters of the system for standard input functions. 3. Formulate different types of analysis to explain the nature of stability of the system. 4. Determine the frequency-domain responses of first and second- order systems. 5. Identify the needs of different types of controllers and compensator to ascertain the required dynamic response from the system and will be able to build state space model of system in different forms
	Principle of Communication System	**REE052**	On completion of this course a successful candidate will 1. To understand basic concepts and terminologies of communication systems 2. To determine frequency domain representation of different signals and systems 3. To analyse modulation and demodulation schemes of analog communication systems 4. To examine different waveform coding and decoding techniques 5. To apply the concepts of multiplexing techniques in TDM hierarchy 6. To analyse different characterises of noise 7. To evaluate performance of different analog communication systems in noisy environment
	Industrial Management	**RAS 601**	On completion of this course a successful candidate will 1. Choose the appropriate design of product 2. Describe production forecasting 3. Select appropriate work study and recognize appropriate work measurement 4. List necessary tools, equipments and exercise proper inventory control 5. Draw a production , planning and schedule

	Sociology	**RAS602**	On completion of this course a successful candidate will 1. Choose better internal relations encompassing formal as well as informal ones 2. Select harmonious and satisfying external relations. 3. Describe dynamics of industrial society 4. Recognize socially fruitful activities 5. Point towards social disintegration.
	Power Electronics	**REE601**	On completion of this course a successful candidate will 1. To illustrate the construction, characteristics of thyristor family and understand the basic principle of operation of SCR. 2. To illustrate the operation of various triggering circuits for series and parallel operation of SCR's and various protection circuits of thyristors. 3. To analysis and design DC/DC converter circuit. 4. To analysis and design AC/DC rectifier circuit. 5. To analysis and design DC/AC inverter circuit. 6. To examine different applications of power converters.
SME VI	**Microprocessor**	**REE602**	On completion of this course a successful candidate will 1. To understand the basic concept of Microprocessor and systems 2.To analyse different Elements of microprocessor and their characteristics 3. To evaluate the Function of Microprocessor and its programming 4. To apply different types of Ics used as a peripheral to make a complete microprocessor system 5. To understand the application of these ICs and their applications to make a complete system 6. To apply the concept of Different Microprocessors and Peripheral Ics for designing 7. To apply Programming concept to make a complete system.

	Power System Analysis	**REE603**	On completion of this course a successful candidate will 1. Understand the concepts of per-unit system and modelling of power system network 2. Create computational models for analysis of both symmetrical and unsymmetrical conditions in power systems 3. Apply load flow analysis to an electrical power network and display the results of the analysis including calculation of losses in system 4. Apply steady state stability analysis of single, two and multi machine system and develop proper mathematical models related to rotor angle stability 5. Understand switching transients and will be able to analyze the fast switching surges in transmission lines.
	Special Electrical Machine	**REE064**	On completion of this course a successful candidate will 1. To gain the knowledge about different types of Induction motor and performance analysis of power recovery schemes 2. To understand and apply the fundamentals of systematically components for the analysis of ac servo meters along with single phase motors 3. To learn about the constructional features and operational methods of stepper motors 4. To acquire knowledge of fundamental principles of universal motor and synchronous motor like reluctance and hysteresis motors 5. Acquire knowledge of constructional details and classifications of linear machines.
	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 CO3 To help the students to develop the understanding of human tradition and its various components 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 CO4 Evaluate the power electronics technology in various process control. K5
	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 benefit analysis of various investment alternatives for meeting the energy needs for the organization. K3 CO6 Students will be able to guide the employees of the organization

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 conclusions for different modulators and demodulators using hardware components. K5 CO5 Analyze the digital communication system with spred spectrum modulations. K4
Power System & Protection	**REE-721**	CO1 Students will be able to list various circuit 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 transmission lines. K1 CO6 Students will be able to recall the protection against overvoltages and working of lightening arrester. K3

	Renewable Energy Resources	**ROE-086**	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 CO5 Analyze Solar,Wind and Bio energy system ,their prospects , advantages and limitations. K4 CO6 Understand the applications of fuel cells, Sea wave energy, Tidal Power and Geo thermal energy.
SEM VIII	**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 systems K2 CO4 Understand the shunt and series compensators in power system K2 CO5 Design and evaluate active power filters and passive filters in power system for mitigation of harmonics. K5

	. EHVAC & DC Transmission	**REE085**	CO1 Understand the basic concepts of EHV AC and 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 noise K2 CO5 Students can analyze travelling waves K4 CO6 To analyse the factors affecting AC-DC transmission. K4

PROGRAM OUTCOME (PO), PROGRAM SPECIFIC OUTCOME (PSO) (2019-20)

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
	PHYSICS	**KAS101**	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
	CHEMISTRY	**KAS102**	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.
	MATHEMATICS -1	**KAS103**	1. Remember the concept of matrices and apply for solving linear simultaneous equations. 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 . 3. Identify the application of partial differentiation and apply for evaluating maxima, minima, series and Jacobians. 4. Illustrate the working methods of multiple

SEM I	**ELECTRICAL ENGINEERING**	**KEE101**	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.
	PROGRAMMING FOR PROBLEM SOLVING	**KCS101**	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.
	ENGINEERING GRAPHICS AND DESIGN	**KCE101**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 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
	WORKSHOP PRACTICES	**KWS101**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice
	PHYSICS	**KAS201**	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
	CHEMISTRY	**KAS202**	1. Get an understanding of the theoretical principles understanding molecular structure, bonding and properties. 2. Know the fundamental concepts of determination of structure with various techniques. 3. Know the fundamental concepts of chemistry applicable in industrial processes.
	MATHEMATICS -II	**KAS203**	1. Understand the concept of differentiation and apply for solving differential equations. 2. Remember the concept of definite integral and apply for evaluating surface areas and volumes. 3. Understand the concept of convergence of sequence and series. Also evaluate Fourier series 4. Illustrate the working methods of complex functions and apply for finding analytic functions. 5. Apply the complex functions for finding Taylor's series, Laurent's series and evaluation of definite integrals.
	ELECTRICAL ENGINEERING	**KEE201**	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
SEM II	**PROGRAMMING FOR PROBLEM SOLVING**	**KCS201**	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.

ENGINEERING GRAPHICS AND DESIGN	**KCE201**	1: Understanding of the visual aspects of engineering design 2: Understanding of engineering graphics standards and solid modelling 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
WORKSHOP PRACTICES	**KWS201**	1. Study and practice on machine tools and their operations 2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding 3. Identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping 4. Welding and soldering operations 5. Apply basic electrical engineering knowledge for house wiring practice Text
PROFFESIONAL ENGLISH	**KAS204**	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 & error-free writing by being well-versed in rules of English grammar & cultivate relevant technical style of communication & presentation at their work place & 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 inter-personal communication skills and positive attitude leading to their professional 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 thermodynami 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.
	Machine Design-I	**NME-501**	On completion of this course a student will be able 1. To design for Static Load 2. To design for Fluctuating Loads 3. To design of helical springs subjected to static and fatigue loading.

Kinematics Of Machines	**NME-502**	On completion of this course a student will be able 1. To understand the basic components and layout of linkages in the assembly of a system / machine. 2. To understand the principle involved in assembly, the displacement, velocity and acceleration at any point in a link of a mechanism. 3. To understand the motion resulting from specified set of linkages. 4. To understand and to design few linkage mechanisms and cam mechanisms for specified output motions. 5. To understand the basic concepts of toothed gearing and kinematics of gear trains.
Manufacturing Science & Technology II	**NME-503**	On completion of this course students are able to 1. Understand metal cutting and its various processes. 2. Understand metal joining processes. 3. Find applications of unconventional machining and welding.
Heat & Mass Transfer	**NME-504**	On completion of this course 3. Students will be able to get a useful foundation and basic knowledge of heat transfer. 4. Knowledge of the subject required for innovative work and advanced studies. 5. Students will get an idea about the subject and well informed about the practical application of different formulae from an engineering point of view.
IC Engines & Compressors	**NME-505**	On completion of this course a student will have 1. Impart the basic concepts of IC engines 2. To study different parts of an engine and process 3. Understand and analyze the engine parameters.

SEM V	**Cyber Security**	**RUC-501**	1. Understanding of the concepts and foundations of computer security, and identify vulnerabilities of IT systems. 2. The basic security tools to enhance system security and can develop basic security enhancements in stand-alone applications. 3. Understand cyber laws. 4. Understand E-Commerce and digital transactions. 5. The basic methods to tackle various types of intrusions on your system.
	Engg. Economics	**NHU-501**	On completion of this course the student will 1. Understand the structure and functioning of the major financial institutions 2. Analyze and evaluate the New Economic Policies of the Government of India 3. Get an orientation to Indian Public Finance 4. Understand the fundamentals of National Income Analysis 5. Analyse the problems of inflation and BOP and suggest measures to control them. 6. Have an understanding of the major issues in International Economics
	Machine Design-I Lab	**NME-551**	On completion of this course students are able to 1. Design & drawing of Cotter joint. 2. Design and drawing of screw jack. 3. Design & drawing of Knuckle joint.
	Seminar	**NME-552**	On completion of this course students are able to 1. Able to identify important concepts from the readings and provided depth in coverage of the topic. 2. Developed effective group communication and presentation skills. 3. Developed self-management & reflection skills. 4. Able to write technical documents and give oral presentation
	Manufacturing Technology II Lab	**NME-553**	On completion of this course students are able to 1. Determine tool wear and tool life. 2. Perform Gas welding experiment. 3. Perform Gear cutting on Milling machine.
	Heat & Mass Transfer Lab	**NME-554**	On completion of this course students are able to 1. Perform experiments on convection, conduction and radiation.

	Machine Design-II	**NME-602**	After taking this course, the student should be able to 1. Design spur, helical and bevel gears. 2. Design of cylinder and cylinder head of IC engine. 3. Design of journal bearing.
	Dynamics Of Machines	**NME-603**	On the completion of this course the student will have 1 Helps to understand basic principles involved in dynamics of machines. 2 Helps to identify and analyze various problems related to balancing of masses. 3 Helps to understand basic concepts of vibration. 4 With a good knowledge of the subject, student will be able to interpret problems related to dynamics of machineries faced in industries.
	Refrigeration & Air-Conditioning	**NME-604**	On the completion of this course the student will have 1 Imparts the basic concepts of Refrigeration and Air conditioning in students. 2 Gives the ability to design refrigeration or air-conditioning equipment that meets the required specification 3 Helps to solves simple problems related to refrigeration. 4 Gives an awareness of basic principles and thermodynamics of refrigeration. 5 Helps to understand various refrigeration components. 6 Helps to design the various components associated with a refrigeration system.
	Mechanical Vibrations	**NME-013**	After taking this course, the student should be able to 1. Find natural frequencies of single, double and several degree of freedom systems. 2. Determine equations of motion in dynamic equilibrium. 3. Find applications of influence coefficients and Maxwell's reciprocal theorem.

SEM VI	**Fluid Machinery**	**NME-021**	After taking this course, the student should be able to 1. Operate every hydraulic machines 2. Analyze and identify various factors affecting the performance of machine 3. Design Protection of every hydraulics machine. 4. Ability to solve flow problems through the hydraulics machines and use of appropriate equations. 5. Ability to apply principles of fluid mechanics to the operation, design, and selection of fluid machinery such as pumps and turbines. 6. Ability to select and evaluate performances of hydropower plants.
	Industrial Management	**NHU-601**	On completion of the course 1 Provides an exposure to the fundamental tools and techniques in Industrial Engineering. 2 Helps to improve inter related work activities and production management in an industry. 3 Gives awareness about product development and design. 4 Helps to 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.
	Industrial Sociology	**RUC 601**	1. Definition of industry, meaning, pre-industrial, industrial society and its system. 2. Work in modern society. 3. Meaning and trends of Industrial disputes in India. 4. Labour welfare. 5. Industry and society
	Fluid Machinery Lab	**NME-651**	On completion of this course 1. Students get a complete awareness on hydraulic machines and flow measuring instruments. 2. Students can find Impact of Jet.

Machine Design - II Lab	**NME-652**	On completion of this course students will be able to 1. Be able to understand basics of spur gears and helical gears. Students will also develop understanding to learn force analysis and design procedures including beam strength and wear strength for both spur gears and helical gears. 2. Be able to learn terminology, force analysis, beam strength and wear strength of bevel gears and worm gears. 3. Be able to learn basics of sliding contact bearings with their different types of lubrication and will be able to select bearing from manufacturer catalogues as per the requirements. Students will also be able to design thrust bearing with pivot and collar configuration. 4. Be able to learn basics of rolling contact bearing including their types, selection and life. Students will be able to select bearing subjected to dynamic equivalent load for roller contact bearing under constant and variable loading along with varying reliability. 5. Be able to design various IC Engine parts e.g. cylinder and cylinder head, piston and its parts like piston ring and gudgeon pin, connecting rod and crankshaft.
Theory of Machines Lab	**NME-653**	On completion of this course students will be able to 1. Find transverse vibration. 2. Find Longitudinal vibration. 3. Determine effect of gyroscope.
Refrigeration & Air-Conditioning	**NME-654**	1. Students are able to study different types of expansion devices. 2. Students are able to perform experiment on air conditioning test rig and calculation of various performance parameters.

	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
SEM VII	**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.

SEM VII	**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**	CO1 Describe the environmental aspects of non-conventional energy 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 operationalmethods of their utilization. CO5 Acquire the knowledge on Geothermal energy.
	NON DESTRUCTIVE TESTING	**RME 080**	CO1 Be able to understand the application of non destructive testing & 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 testing like Ultrasonic testing methods for determining the defects in different manufacturing process. CO5 Enables to take best course of action out of several alternative courses for the purpose of achieving objectives by some special technique like eddy current inspectio
	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