

Programme and Course Outcomes
of
Programmes



JIS College of Engineering
Block A, Phase III,
Kalyani, Nadia- 741235
West Bengal

PROGRAM OUTCOMES (POs) [B.Tech in Biomedical Engineering]

PO1 Engineering knowledge: Apply the knowledge of mathematics, science, and engineering fundamentals to solve the problems related to Biomedical Engineering.

PO2 Problem analysis: Identify, formulate, review research literature, and analyze complex Biomedical Engineering problems to arrive at suitable conclusions using first principles of mathematics, anatomy & physiology, natural sciences, and engineering sciences.

PO3 Design/development of solutions: Design solutions for complex Biomedical Engineering problems and develop healthcare 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.

PO4 Conduct investigations of complex problems: Use research-based knowledge and research methods to **conduct investigations/ evaluate results/ interpret results** to arrive at the most effective solution for solving Biomedical Engineering problems.

PO5 Modern tool usage: Create, select and apply appropriate techniques, resources, electronic components, modern engineering and IT tools including prediction and modelling to complex bioengineering activities with an understanding of the limitations to demonstrate concepts in Healthcare Engineering.

PO6 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 Biomedical Engineering practice.

PO7 Environment and sustainability: Understand the impact of the professional biomedical engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the Healthcare engineering practice.

PO9 Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary systems.

PO10 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. (Applying)

PO11 Project management and finance: Apply the knowledge and understanding of project management, Biomedical Engineering resource management and cost analysis while implementing projects in medical science.

PO12 Life-long learning: Recognize the need for and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)[B.Tech in Biomedical Engineering]

- **PSO1:** Identify, analyze and solve the real life problems by applying principles of Biomedical engineering with novelty.
- **PSO2:** Design, develop and specify the mathematical model to understand the inter- relation among various Physiological systems.
- **PSO3:** Investigate, implement and demonstrate various applications of the engineering and physiological subsystems in designing and developing human body systems.

COURSE OUTCOMES [B.Tech in Biomedical Engineering]

M101: MATHEMATICS –I

M 101.1: Recall the distinctive characteristics of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis.

M 101.2: Understand the theoretical concept of Matrix Algebra, Calculus of Single and Several variables and Vector Analysis.

M 101.3: Apply the principles of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis to solve various problems.

CH 101: CHEMISTRY

CH101.1: Able to apply fundamental concepts of thermodynamics in different engineering applications.

CH101.2: Able to analyze & design simple and technologically advanced electrical and energy storage devices.

CH101.3: Able to synthesize nanomaterials, composites, polymers.

CH101.4: Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries , and technical fields.

CH101.5: Able to apply the knowledge of different fuels and corrosion to different industries

CH101.6: Able to analyse water quality parameter for its various parameters & its significance in industries.

EE101: BASIC ELECTRICAL ENGINEERING

EE 101.1: To understand and analyze basic electric and magnetic circuits.

EE 101.2: To understand and analysis the AC single phase and three phase circuit

EE101.3: To understand and analysis of the basic principles of various electrical machines

HU101: COMMUNICATIVE ENGLISH

HU101.1: Able to comprehend and communicate in English through exposure to communication skills theory and practice.

HU101.2: Apply the basic grammatical skills of the English language through intensive practice.

HU101.3: Able to develop reading and comprehension skills.

HU101.4: Able to develop writing proficiency skills by writing Official Letters, Technical report, memo, notice, minutes, agenda, resume, curriculum vitae.

HU101.5: Able to apply/illustrate all sets of English language and communication skills in creative and effective ways in the professional sphere of their life.

ME101: ENGINEERING MECHANICS

ME 101.1: Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.

ME 101.2: Study the effect of friction in static and dynamic conditions.

ME 101.3: Understand the different surface properties, property of masses and material properties.

ME 101.4: Analyze and solve different problems of kinematics and kinetics.

CH 191: CHEMISTRY LAB

CH191.1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CH191.2: Able to work as an individual also as a team member.

CH191.3: Able to analyze different parameters of water considering environmental issues.

CH191.4: Able to synthesize nano and polymer materials.

CH191.5: Capable to design innovative experiments applying the fundamentals of chemistry.

EE191: BASIC ELECTRICAL ENGINEERING LAB

EE191.1: Identify common electrical components and their ratings.

EE191.2: Make Circuit connection by wires of appropriate ratings.

EE191.3: Understand the usage of common electrical measuring instruments.

EE191.4: Understand the basic characteristics of transformers and electrical machines

HU191: LANG. LAB. AND SEMINAR PRESENTATION

HU191.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.

HU191.2: Able to apply listening, speaking, reading and writing skills in societal and professional life.

HU191.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.

HU191.4: Able to analyze communication behaviors.

HU191.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

ME 191: ENGINEERING DRAWING & GRAPHICS

ME191.1: Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.

ME191.2: Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.

ME191.3: Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

ME191.4: Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

M 201: MATHEMATICS-II

M 201.1: Recall the distinctive characteristics of Ordinary Differential Equations, Graph Theory and Laplace Transform.

M 201.2: Understand the theoretical workings of various algorithms related to graph theory and the theorems of differential equation and Laplace transforms.

M 201.3: Apply the principles of differential equation, graph theory and Laplace transforms to solve various problems.

PH 201: PHYSICS -I

PH201.1: Describe various types' mechanical resonance and its electrical equivalence.

PH201.2: Explain basic principles of Laser, Optical fibers and various types of semiconductors.

PH201.3: Apply superposition to explain interference and diffraction as well as apply wave mechanics to attainment of Heisenberg's uncertainty principle.

PH201.4: Analyze importance of light as a carrier of information and examine different crystallographic structures according to their co-ordination number and packing factors.

PH201.5: Justify the need of a quantum mechanics as remedy to overcome limitations imposed by classical physics.

EC201: BASIC ELECTRONICS ENGINEERING

EC 201.1: Study PN junction diode, ideal diode, diode models and its circuit analysis, application of diodes and special diodes.

EC 201.2: Learn how operational amplifiers are modeled and analyzed, and to design Op-Amp circuits to perform operations such as integration, differentiation on electronic signals.

EC 201.3: Study the concepts of both positive and negative feedback in electronic circuits.

EC 201.4: Develop the capability to analyze and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis.

EC 201.5: Learn how the primitives of Boolean algebra are used to describe the processing of binary signals.

CS201: COMPUTER FUNDAMENTALS & PRINCIPLE OF COMPUTER PROGRAMMING

CS201.1 Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming.

CS201.2 Write, Compile and Debug programs in C language and use different data types for writing the programs.

CS201.3 Design programs connecting decision structures, loops and functions.

CS201.4 Explain the difference between call by value and call by address.

CS201.5 Understand the dynamic behavior of memory by the use of pointers.

ME 201: ENGINEERING THERMODYNAMICS & FLUID MECHANICS

ME 201.1: Know about thermodynamic equilibrium, heat & work transfer, First law and its application.

ME 201.2: Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.

ME 201.3 Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)

ME 201.4 Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations

PH 291: PHYSICS I LAB

PH 291.1: Demonstrate experiments allied to their theoretical concepts.

PH 291.2: Conduct experiments using LASER, Optical fiber, Torsional pendulum, Spectrometer.

PH 291.3: Participate as an individual, and as a member or leader in groups in laboratory sessions actively.

PH 291.4: Analyze experimental data from graphical representations, and to communicate effectively them in Laboratory reports including innovative experiments.

EC291: BASIC ELECTRONICS ENGINEERING LAB

EC291.1: Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.

EC291.2: Analyze the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.

EC291.3: Determination of input-offset voltage, input bias current and Slew rate, Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.

EC291.4: Able to know the application of Diode, BJT & OPAMP.

EC291.5: Familiarization and basic knowledge of Integrated Circuits

CS291: COMPUTER FUNDAMENTALS & PRINCIPLE OF COMPUTER PROGRAMMING LAB

CS291.1: Understanding the working of different operating systems like DOS, Windows, Linux.

CS291.2: Write, Compile and Debug programs in C language.

CS291.3: Design programs connecting decision structures, loops.

CS291.4: Exercise user defined functions to solve real time problems.

CS291.5: Inscribe C programs using Pointers to access arrays, strings, functions, structures and files.

ME 292: WORKSHOP PRACTICE

ME 291.1: Gain basic knowledge of Workshop Practice and Safety useful for our daily living.

ME 291.2: Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and performing operations like such as Marking, Cutting etc used in manufacturing processes.

ME 291.3: Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.

ME 291.4: Get hands on practice of in Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

M(BME) 301: MATHEMATICS - III

M(BME)301.1: Recall the distinctive characteristics of mathematical approaches like Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Correlation & Regression, Calculus of Complex Variables, Ordinary Differential Equations, Partial Differential Equations.

M(BME)301.2: Understand the theoretical workings of mathematical approaches like Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Correlation & Regression, Calculus of Complex Variables, Ordinary Differential Equations, Partial Differential Equations to evaluate the various measures in related field.

M(BME)301.3: Develop mathematical model of various real world scenarios using concepts of mathematical approaches like Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Correlation & Regression, Calculus of Complex Variables, Ordinary Differential Equations, Partial Differential Equations and solve the same.

BME 301: ENGINEERING PHYSIOLOGY & ANATOMY

BME 301.1: Identify and get an in-depth understanding of anatomy and physiology of the cardiovascular system (heart and blood vessel), the pulmonary system (lung), the renal system, the digestive system, the nervous system, the muscular system and the skeletal system.

BME 301.2: Apply knowledge to comprehend and explain the corresponding structure function relationship of these physiological systems.

BME 301.3: Apply a broad knowledge of Physiology & Anatomy of organ system to logically analyze the mechanisms of function, integration and homeostasis involved in physiological parameters and energy balance.

BME 301.4: Analyze the Structure – Function relations of various human organ systems, to arrive at suitable conclusions to identify problems related to deformity or deviation from normal physiological processes in living systems.

BME 301.5: Interpret physiological abnormality and malfunctioning and its impact on health, safety, environment and society.

BME 302: BIOPHYSICAL SIGNALS & SYSTEMS

BME 302.1: Represent & classify signals, Systems & identify LTI systems

BME 302.2: Derive Fourier series for continuous time signals

BME 302.3: Find Fourier transform for different signals

BME 302.4: Analyze the Continuous Time systems by performing Convolution

BME 302.5: Analyze DT systems & their realization using Z-transforms

EE(BME)303: CIRCUIT THEORY & NETWORKS

EE(BME)303.1: Understand, Describe, Analyze and Design series and parallel RLC circuits and solve related problems.

EE(BME)303.2: Analyze circuits using Node Voltage & Mesh Current Analysis in electrical networks and solve related problems.

EE(BME)303.3: Apply and Analyze Network Theorems to electrical networks to evaluate network parameters in simplified ways.

EE(BME)303.4: Understand, Describe, Analyze and Design Graph and Trees for a given network and build network matrices and solve related problems.

EE(BME)303.5: Understand Describe, Analyze and Design Coupled (Magnetic and Electromagnetic) Circuits and solve related problems.

EE(BME)303.6: Understand, Describe and Analyze the Transients in electrical networks and solve related problems.

EE(BME)303.7: Apply Laplace Transform and form Transfer Function for different kinds of electrical networks for analyzing them and solve related problems.

EC(BME)304: ANALOG ELECTRONICS CIRCUIT

EC(BME)304.1: Able to explain/give example/explain concept of AnalogElectronics Circuits.

EC(BME)304.2: Able to apply knowledge, mathematics, science and engineering fundamentals to solve Analog electronics Circuits related problems.

EC(BME)304.3: Able to perform logical analysis of result/Systems of AnalogElectronics Circuits.

BME 391: ENGINEERING PHYSIOLOGY & ANATOMY LABORATORY

BME 391.1: Identify, understand and explain fundamentals of organ structure at the cellular, tissue, organ, & system levels.

BME 391.2: Apply knowledge of science and engineering fundamentals to get hands on exposure of the gross & microscopic approach to Anatomy & Physiology of various organs.

BME 391.3: Perform logical analysis of results, with all necessary lab tools through experiments to arrive at suitable conclusions to physiological problems that promote the critical understanding of the structure function relationship of human systems.

BME 391.4: Conduct and design experiments using modern engineering tools and instruments to demonstrate and interpret physiological abnormality and malfunctioning and its impact on health, safety, environment and society.

BME 391.5: Function effectively as an individual, and as a member in a team to conduct experiments and interpret results.

BME 391.6: Conform to Physiology Practical ethics, and understand the responsibilities and norms of Physiology Laboratory practice.

BME 392: BIOPHYSICAL SIGNALS & SYSTEMS LABORATORY

BME 392.1: Analyze continuous-time and discrete-time signals and systems in the frequency domain using mixed signal classes Using MATLAB.

BME 392.2: Explore sampling concepts that link continuous-time and discrete-time signals and systems Using MATLAB.

BME 392.3: Analyze continuous-time signals and system responses using the concepts of transfer function representation by use of Laplace and inverse Laplace transforms Using MATLAB.

BME 392.4: Analyze discrete-time signals and system responses using the concepts of transfer function representation by use of Z and inverse-Z transforms Using MATLAB .

BME 392.5: Apply time-domain and frequency-domain analysis tools to analog and digital filters Using MATLAB.

EE(BME)393: CIRCUITS & NETWORKS LABORATORY

EE(BME)393.1: Describe Analyze and Design series and parallel RLC circuits using MATLAB.

EE(BME)393.2: Analyze circuits using Node Voltage & Mesh Current Analysis in electrical networks using MATLAB.

EE(BME)393.3: Verify and analyze Network Theorems to electrical networks using MATLAB.

EE(BME)393.4: Understand Describe, Analyze and Design Graph and Trees for a given network and solve related problems using MATLAB.

EE(BME)393.5: Understand Analyze and Design Coupled Circuits and solve related problem using MATLAB.

EE(BME)393.6: Understand, Describe and Analyze the Transients in electrical networks and solve related problems using MATLAB.

EE(BME)393.7: Implement Laplace Transform and its Inverse transform on various waveforms using MATLAB.

EC(BME)394: ANALOG ELECTRONIC CIRCUITS LABORATORY

EC(BME)394.1: Able to explain/give example/explain concept of Analog Electronics Circuits.

EC(BME)394.2: Able to apply knowledge, mathematics, science and engineering fundamentals to solve Analog electronics Circuits related problems.

EC(BME)394.3: Able to perform logical analysis of result/Systems of Analog Electronics Circuits.

HU(BME)401: ENVIRONMENTAL SCIENCE

HU(BME)401.1: Describe the structure and function of environment and different types of environmental pollution.

HU(BME)401.2: Identify all types of resources and learn the quality parameter to maintain proper balance.

HU(BME)401.3: Demonstrate environmental problems like global warming, acid rain, natural and manmade disasters.

HU(BME)401.4: Demonstrate the controlling method of environmental pollution and apply their knowledge for environment management.

HU(BME)401.5: Apply the method of synthesis of green chemistry and find green solution.

PH(BME)401: PHYSICS-II

PH(BME)401.1: Explain the action of various types of microscopes , imaging and radioactive systems.

PH(BME)401.2: Apply Schrödinger equation in variety of atomic scale problems including nanomaterials.

PH(BME)401.3: Analyze the physics of various kinds of electric and magnetic materials.

PH(BME)401.4: Justify the importance of ultrasonic sound in biomedical engineering.

EC(BME) 401: DIGITAL ELECTRONIC CIRCUITS

EC(BME) 401.1: Understand and describe different number systems and their conversions, signed binary number representation and binary arithmetic and solve related numerical.

EC(BME) 401.2: Solve relevant numerical applying Boolean algebra and logic gates.

EC(BME) 401.3: Describe, analyze, formulate and construct combinational & sequential networks.

EC(BME) 401.4: Understand and explain memory systems and different kinds of logic families.

EC(BME) 401.5: Demonstrate basic analog-to-digital and digital-to-analog circuits.

BME402: BIOMECHANICS

BME402.1: Understand the fundamentals of mechanics and its application in human system.

BME402.2: Describe the flow properties of blood, various properties of hard tissues (bone) & soft tissues (articular cartilage, tendons and ligaments) and identify the appropriate model to demonstrate mechanical behavior.

BME402.3: Analyze the biomechanics of different human joints and also the forces at a skeletal joint for various static and dynamic human activities.

BME402.4: Gain broad working knowledge about the mechanics of moving systems and familiarity with human anatomy to competently analyze gross movement and dynamics of the human body.

BME402.5: Demonstrate a detailed understanding of the design requirements of medical implants based on the human anatomy and biological responses to biomaterials.

BME403: BIOMATERIALS

BME403.1: Identify and understand the fundamental concepts in material science (e.g., atomic structure and bonding, crystalline structures and defects) and interpretation of phase diagrams.

BME403.2: Apply a broad knowledge of different types of biomaterials including metals, polymers, ceramics and composites and their use in typical biomedical devices and clinical applications.

BME403.3: Design an implant using fundamental concept and modern engineering tools to develop hard tissue and soft tissue replacement materials by suitable material selection.

BME403.4: Analyze the design of various biocompatible implants and artificial organ to develop and improve Health Care Service to serve mankind and society.

BME403.5: Demonstrate an understanding of standards, regulations and ethical responsibilities in the process of developing biomaterials and medical devices, evaluating and analysing possible hurdles in bringing a product to market.

PH(BME)491: PHYSICS-II Lab

PH(BME)491.1: Demonstrate experiments allied to their theoretical concepts.

PH(BME)491.2: Conduct experiments using semiconductors , dielectric and ferroelectrics, ultrasounds.

PH(BME)491.3: Classify various types of magnetic materials.

PH(BME)491.4: Participate as an individual, and as a member or leader in groups in laboratory sessions actively.

PH(BME)491.5: Analyze experimental data from graphical representations , and to communicate effectively them in Laboratory reports including innovative experiments.

EC(BME)491: DIGITAL ELECTRONIC CIRCUITS LABORATORY

EC(BME)491.1: Understand and describe Digital ICs of different logic gates.

EC(BME)491.2: Design and show the operation of basic logic gates & Universal logic gates.

EC(BME)491.3: Describe, design and analyze combinational circuits.

EC(BME)491.4: Describe, design and analyze sequential circuits.

BME492: BIOMECHANICS & BIOMATERIALS LABORATORY

BME492.1: Perform Mechanical characterization of biomaterials using destructive and non destructive methods.

BME492.2: Measure Surface roughness & *invitro* haemocompatibility of biomaterials

BME492.3: Determine the moment of inertia of human limb & torque required to tap and screwing the dental implants in Jaw bone.

BME492.4: Perform ph determination, viscosity and Conductivity measurement of any body fluid.

BME 501: BIOMEDICAL INSTRUMENTATION

BME 501.1: Describe and characterize the origin of bio-potentials and inspect common biomedical signals by their characteristics features.

BME 501.2: Understand the basic instrumentation system with their limitations & familiarize with pc based medical instrumentation & control of medical devices.

BME 501.3: Describe and characterize medical instruments as per their specifications, static & dynamic characteristics and understand data acquisition system.

BME 501.4: Describe, analyze, characterize and design bio-potential amplifiers.

BME 501.5: Understand, describe, characterize and design various medical recording systems & their components.

BME 501.6: Understand and describe patient monitoring systems and its necessity in healthcare system.

BME 502: BIOMEDICAL DIGITAL SIGNAL PROCESSING

BME 502.1: Understand the fundamental techniques & applications of digital signal processing with emphasis on biomedical signals.

BME 502.2: Implement algorithms based on discrete time signals.

BME 502.3: Understand circular and linear convolution and their implementation in DFT and analyze signals.

BME 502.4: Understand efficient computation techniques such as DIT and DIF FFT Algorithms.

BME 502.5: Design FIR filters using digital IIR filters by designing prototype analog filters and then applying analog to digital conversion.

BME 503: BIOSENSORS & TRANSDUCERS

BME 503.1: Gain a broad knowledge of the applications of various sensors and transducers available for physiological and cellular measurements.

BME 503.2: Describe the fundamental transduction and bio-sensing principles.

BME 503.3: Understand various measurement devices and techniques, including the underlying biological processes that generate the respective quantities to be measured or controlled.

BME 503.4: Develop a clear concept and perform logical analysis of various measurement systems using different types of sensors, electrodes, signal conditioning circuits for acquiring and recording various physiological parameters.

BME 503.5: Critically review the literature in the application area and apply knowledge gained from the course to analyze simple bio-sensing and transduction problems.

BME 504: MEDICAL IMAGING TECHNIQUES

BME 504.1: Understand the physics & principles underlying the operation of different medical imaging equipment.

BME 504.2: Gain knowledge and explain the effects of radiations on biological tissues.

BME 504.3: Identify and analyze the basics of X-ray and US imaging modality.

BME 504.4: Interpret the most effective imaging modality for a particular organ.

BME 504.5: Implement efficient radiation safety protocols in the operation of various medical imaging equipments.

BME505A: HOSPITAL ENGINEERING & MANAGEMENT

BME505A.1: Define and understand about hospital classification, criteria regarding organization, assessment, management, administration and regulation of modern healthcare technology.

BME505A.2: Gain broad knowledge of workflow of different departments of the hospital and their responsibilities.

BME505A.3: Investigate, evaluate and develop better management of information regarding identification of biomedical and hospital technology planning, procurement and operation requirements.

BME505A.4: Formulate and analyze network within the organization connecting medical professional and other healthcare technology managers for best practices and solutions for common issues.

BME505A.5: Understand and apply professional ethics and legal issues related to hospital engineering and healthcare system management, administration and regulation of healthcare technology.

BME505A.6: Implement efficient and safe technology use, considering the importance and impact of technology on patient care improving clinical effectiveness.

BME 505B: BIOHEAT & MASS TRANSFER

BME505B.1: Ability to understand and solve conduction, convection and radiation problems

BME505B.2: Ability to design and analyze the performance of heat exchangers and evaporators

BME505B.3: Ability to design and analyze reactor heating and cooling systems

BME505B.4: Ability to understand about the diffusion mass transfer and operation of the cooling tower will be clearly understood.

BME 505C: BIONANOTECHNOLOGY

BME 505C.1: Understand the basics of bio-nanotechnology and its application.

BME 505C.2: Understand the fundamental principles of nanotechnology and their application to biomedical engineering.

BME 505C.3: Demonstrate a comprehensive understanding of state-of-the-art nano-fabrication methods.

BME 505C.4: Apply and transfer interdisciplinary systems engineering approaches to the field of bio- and nano-technology projects.

BME 505C.5: Practice and explain state-of-the-art characterization methods for nano-materials, understanding and critiquing nanomaterial safety and handling methods required during characterization.

CS(BME) 506A: DATA STRUCTURE & ALGORITHM

CS(BME) 506A.1: Graduates will be able to use different kinds of data structures which are suited to different kinds of applications, and some are highly specialized to specific tasks. For example, B-trees are particularly well-suited for implementation of databases, while compiler implementations usually use hash tables to look up identifiers.

CS(BME) 506A .2: Graduates will be able to manage large amounts of data efficiently, such as large databases and internet indexing services.

CS(BME) 506A .3: Graduates will be able to use efficient data structures which are a key to designing efficient algorithms.

CS(BME) 506A .4: Graduates will be able to use some formal design methods and programming languages which emphasize on data structures, rather than algorithms, as the key organizing factor in software design.

CS(BME) 506A .5: Graduates will be able to store and retrieve data stored in both main memory and in secondary memory.

CS(BME)506B: DATA BASE MANAGEMENT SYSTEM

CS(BME)506B.1: Understand fundamental elements of a relational database management system

CS(BME)506B.2: Understand the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and database language SQL

CS(BME)506B.3: Identify other data models such as object-oriented model and XML model

CS(BME)506B.4: Design entity-relationship diagrams to represent simple database application scenarios

CS(BME)506B.5: Convert entity-relationship diagrams into relational tables, populate a relational database and formulate SQL queries on the data

CS(BME)506B.6: Criticize a database design and improve the design by normalization

CS(BME)506B.7: Develop team spirit and professional attitude towards the development of database applications

EE(BME)506C: CONTROL ENGINEERING

EE(BME)506C.1: Ability to understand and explain basic structure of control systems, basic terminologies, components.

EE(BME)506C.2: Ability to represent physical systems into transfer function form and thus can analyze system dynamic and steady state behavior.

EE(BME)506C.3: Ability to analyze system stability and design controllers, compensators in frequency domain.

BME591: BIOMEDICAL INSTRUMENTATION LABORATORY

BME591.1: Understand and implement isolation techniques in designing biomedical instruments.

BME591.2: Understand & describe the electrode placement and analyze QRS Component & Heart Rate.

BME591.3: Describe the instrumentation & operation of an X-ray system.

BME591.4: Investigate & evaluate ON-Time & OFF-Time delay of a waveform.

BME591.5: Analyze and Interpret EMG, ECG, EEG and PCG waveforms in diagnostic point of views.

BME591.6: Design power supply unit, bio-potential amplifiers and filters.

BME592: BIOMEDICAL DIGITAL SIGNAL PROCESSING LABORATORY

BME592.1: Understand the fundamental techniques and applications of DSP with emphasis on biomedical signals.

BME592.2: Implement z-transform, DTFT, DFT and DWT to analyze and design DSP systems.

BME592.3: Analyze the applications of FFT to DSP & finite word length effect on DSP systems.

BME592.4: Design adaptive filters for various applications of Biomedical Signal Processing.

BME593: BIOSENSORS & TRANSDUCERS LABORATORY

BME593.1: Understand the working principle and characteristics of different types of sensors and transducers useful in medical field.

BME593.2: Implement different sensors as per their applications in biomedical instrumentation.

BME593.3: Explain the different diagnostic methods for identification of human bio-potentials and their necessary instrumentation.

CS(BME) 596A: DATA STRUCTURE & ALGORITHM LABORATORY

CS(BME) 596A .1: Write well-structured procedure-oriented programs of up to large lines of code.

CS(BME) 596A .2: Analyze run-time execution of previous learned sorting methods, including selection, merge sort, heap sort and Quick sort.

CS(BME) 596A .3: To implement the Stack ADT using both array based and linked-list based data structures.

CS(BME) 596A .4: To implement the Queue ADT using both array based circular queue and linked-list based implementations. Able to implement binary search trees.

CS(BME)596B: DATA BASE MANAGEMENT SYSTEM LAB

CS(BME)596B.1: Data Definition Language (DDL) commands in RDBMS.

CS(BME)596B.2: Data Manipulation Language (DML) and Data Control Language (DCL) commands in RDBMS.

CS(BME)596B.3: High-level language extension with Cursors.

CS(BME)596B.4: High level language extension with Triggers.

CS(BME)596B.5: Procedures and Functions. Embedded SQL.

CS(BME)596B.6: Database design using E-R model and Normalization.

CS(BME)596B.7: Development of mini projects

EE(BME)596C: CONTROL ENGINEERING LABORATORY

EE(BME)596C.1: Ability to simulate, analyze system behavior using software simulator/hardware.

EE(BME)596C.2: Ability to design compensators, controllers to meet desired performance of a system.

BME 601: ANALYTICAL & DIAGNOSTIC EQUIPMENT

BME601.1: Understand the fundamentals and application of current chemical and scientific theories in analytical & diagnostic equipments.

BME601.2: Apply the knowledge to identify the various types of analytical & diagnostic equipments used in Biomedical Engineering.

BME601.3: Explain the working principle, functional and constructional features of different analytical & diagnostic medical instruments used for sensing and measuring various physiological parameters of human body.

BME601.4: Acquire the knowledge and skills & apply proper techniques for measuring of basic medical parameters and analyze basic features of the equipment for using in electro diagnostic and electro therapy.

BME 602: BIOPHYSICS & BIOCHEMISTRY

BME602.1: Acquire, articulate and retain broad and in-depth knowledge and understanding of the ways by which life functions are explained in terms of the principles of chemistry and physics and fundamental processes of Biochemistry and Biophysics.

BME602.2: Identify and analyze complex problems related to Formation of Structures in Biological Systems, Structural-Functional Relationships of Nucleic Acid and proteins, Biophysical activity, Radioactivity to arrive at suitable conclusions using first principles of Biophysics and Biochemistry.

BME602.3: Design, develop and conduct investigations to evaluate and interpret results to solve problems related to Cellular Biochemistry, Biophysical and Biochemical activity.

BME602.4: Apply appropriate techniques, resources, modern engineering tools including prediction and modeling to complex biophysical, biochemical and biomolecular activities with an understanding of the limitations to demonstrate concepts in Clinical Science.

BME602.5: Become familiar with the complexity of issues in the biochemistry, biophysics, and molecular biology domain, including scientific and moral ethics, cultural diversity and environmental concerns and in turn develops an awareness of ethical responsibilities while conducting and reporting investigations.

BME 603: MODELING OF PHYSIOLOGICAL SYSTEM

BME603.1: Understand the requirements for the development of mathematical and computational models in the analysis of physiological process/ biological systems.

BME603.2: Select and apply appropriate analytical and numerical tools to solve ordinary differential equation models of biological problems.

BME603.3: Understand, predict and interpret the biological significance of linear and nonlinear control systems.

BME603.4: Integrate electrical, electrochemical, physiological and mechanical phenomena into the design of models to assess their inter-dependencies.

BME603.5: Break down a complex physiological system into the function of its component subsystems, and then build an engineering model based on subsystems.

BME 604: ADVANCED IMAGING SYSTEMS

BME 604.1: Advanced and integrated understanding of the applications of physical processes to the diagnosis and treatment of disease, including an understanding of contemporary developments in professional practice.

BME 604.2: Advanced understanding of the origins of radiation and its interactions with matter pertaining to the production and use of ionizing radiation, with particular regard to the protection of people and environments.

BME 604.3: Develop an understanding of the different modalities in Radiology and recognize the images of each modality.

BME 604.4: Describe the differences between the modalities, the method of imaging and safety precautions.

BME 605A: COMMUNICATION SYSTEMS & BIOTELEMETRY

BME605A.1: Define the methods of modulating signal.

BME605A.2: Recognize amplitude and phase/frequency of the electromagnetic wave.

BME605A.3: Illustrate transmission and receptions of binary streams and voice signals.

BME605A.4: Inspect constraints of designing communication systems namely noise, power.

BME605A.5: Integrate the idea of information as measurable quantity.

BME605A.6: Compare methods of probabilistic source coding and error correction techniques are ingrained quantitatively.

BME 605B: DRUG DELIVERY SYSTEM

BME 605B.1: Understand the various approaches for development of novel drug delivery systems.

BME 605B.2: Select the criteria of drug and polymers for the development of drug delivering system.

BME 605B.3: Formulate and evaluate the novel drug delivery systems.

BME 605C: BIOINFORMATICS

BME 605C.1: An ability to demonstrate the basic structure and functionalities of Cell Organelles.

BME 605C.2: Master computational techniques and diversified bioinformatics tools for processing data.

BME 605C.3: Ability to carry out bioinformatics research under advisement, including systems biology, structural bioinformatics and proteomics.

BME 605C.4: The broad education necessary to understand the impact of bioinformatics in a global, economic, environmental, and societal context.

EI(BME)606A: MICROPROCESSORS & MICROCONTROLLERS

EI(BME)606A.1: Able to correlate the architecture , instructions, timing diagrams, addressing modes, memory interfacing, interrupts, data communication of 8085.

EI(BME)606A.2: Able to interpret the 8086 microprocessor-Architecture, Pin details, memory segmentation, addressing modes, basic instructions, interrupts.

EI(BME)606A.3: Recognize 8051 micro controller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o, interrupts

EI(BME)606A.4: Apply instructions for assembly language programs of 8085, 8086 and 8051

EI(BME)606A.5: Design peripheral interfacing model using IC 8255, 8253, 8251 with IC 8085, 8086 and 8051.

EC(BME) 606B: VLSI & Embedded System

EC(BME) 606B.1: Describe MOS transistor structure and operation and write current voltage equations for nMOS & pMOS.

EC(BME) 606B.2: Explain the operation of CMOS combinational and sequential circuits.

EC(BME) 606B.3: Solve the problem of static and dynamic circuit design with CMOS.

EC(BME) 606B.4: Describe the operation of low power circuits.

EC(BME) 606B.5: Generate different subsystems using MOS circuits.

EC(BME) 606B.6: Understand the fundamentals of the embedded systems.

EC(BME) 606B.7: State programming concepts paradigms of for embedded systems.

EC(BME) 606B.8: Describe the Basic OS fundamentals and the RTOS.

IT(BME)606C: SOFT COMPUTING

IT(BME)606C.1: To provide a strong foundation of fundamental concepts in Soft Computing.

IT(BME)606C.2: To provide a basic exposition to the goals and methods of Soft Computing.

IT(BME)606C.3: To enable the student to apply these techniques in applications which involve fuzzy-perception, reasoning and learning.

IT(BME)606C.4: To enable the student to apply these techniques in applications which involve Neuro-Fuzzy modeling and optimization.

BME 691: BIOMEDICAL EQUIPMENT LABORATORY

BME691.1: Understand the fundamental principles and utilization of different biomedical analytical devices and measurement of different sample concentration using those devices.

BME691.2: Acquire the knowledge and skills to recognize different biomedical diagnostic devices with their design, basic functions and application.

BME691.3: Analyze the working principle of different therapeutic devices and how they are applied to give physiotherapy to the patients.

BME691.4: Apply knowledge of engineering and science to understand the principle of biomedical electronic devices and understand how to apply, measure circuit performance, and solve problems in the areas of biomedical signals.

BME 695A: COMMUNICATION SYSTEMS & BIOTELEMETRY LABORATORY

BME 695A.1: Practice the practical methods of the use of generating communication signals.

BME 695A.2: Understand the concept of analog and digital communication techniques and their applications.

BME 695A.3: Design various circuits which needs transmitting & receiving section.

BME 695A.4: Measure various parameters of any signal.

BME 695A.5: choose among modulation techniques based on need.

BME 695B: DRUG DELIVERY SYSTEM LABORATORY

BME 695B.1: Describe the effects of different factors influencing the solubility and availability of drugs.

BME 695B.2: Formulate the different drug delivery systems.

BME 695B.3: Analyze the different types of drugs available in the market.

BME695C: BIOINFORMATICS LABORATORY

BME695C.1: An ability to extract information from different types of bioinformatics data (gene, protein, disease, ecological, environmental etc.), including their biological characteristics and relationships.

BME695C.2: An ability to employ different data representation models and formats used for bioinformatics data representation.

BME695C.3: Master computational techniques and diversified bioinformatics tools for processing data.

BME695C.4: Ability to carry out bioinformatics research under advisement, including systems biology, structural bioinformatics and proteomics.

BME695C.5: An ability to design and develop bioinformatics solutions by adapting existing tools, designing new ones or a combination of both.

EI(BME)696A: Microprocessors & Microcontrollers Lab

EI(BME)696A.1: Able to solve small assignments using the 8085 basic instruction sets and memory mapping through trainer kit and simulator.

EI(BME)696A.2: Able to write 8085 assembly language programs like Addition, Subtraction, Multiplication, Square, Complement, Look up table, Copying a block of memory, Shifting ,Packing and unpacking of BCD numbers, Ascending order, Descending order etc. using trainer kit.

EI(BME)696A.3: Able to validate the interfacing technique using 8255 trainer kit through subroutine calls and IN/OUT instructions like glowing LEDs accordingly, stepper motor rotation etc.

EI(BME)696A.4: Able to test fundamental of 8051 programs using the trainer kit.

EC(BME)696B: VLSI & EMBEDDED SYSTEM LABORATORY

EC(BME)696B.1: Identify circuit diagrams composed of CMOS.

EC(BME)696B.2: Explain the simulation flow of the CMOS based Circuits.

EC(BME)696B.3: Interpret a CMOS based circuit for functionality.

EC(BME)696B.4: Generate any CMOS based circuit static as well as dynamic and simulate

EC(BME)696B.5: Write embedded code for to acquire and display sensor data.

EC(BME)696B.6: Write embedded code for interfacing.

IT(BME)696 C: SOFT COMPUTING LABORATORY

IT(BME)696C.1: To provide a strong foundation of fundamental concepts in Soft Computing.

IT(BME)696C.2: To provide a basic exposition to the goals and methods of Soft Computing.

IT(BME)696C.3: To enable the student to apply these techniques in applications which involve fuzzy-perception, reasoning and learning.

IT(BME)696C.4: To enable the student to apply these techniques in applications which involve Neuro-Fuzzy modeling and optimization.

HU 703: ECONOMICS FOR ENGINEERS

HU 703.1: Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio.

HU 703.2: Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.

HU 703.3: Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems.

HU 703.4: Evaluate the profit of a firm, carry out the break even analysis and employ this tool to make production decision.

HU 703.5: Discuss and solve advanced economic engineering analysis problems including taxation and inflation.

BME 701: THERAPEUTIC EQUIPMENTS

BME701.1: Identify suitable therapeutic devices for ailments related to cardiology, pulmonology, neurology, etc.

BME701.2: Understand and explain the working principle of different types of therapeutic devices like pacemakers, defibrillators, ventilators, anaesthesia machine and surgical devices like electrosurgery unit.

BME 701.3: Analyze different types of therapeutic devices including pediatric applications and support.

BME 701.4: Appreciate the application of lasers in biomedical applications.

BME 702A: MEDICAL IMAGE PROCESSING

BME702A.1: Understand different application of medical image processing.

BME702A.2: Analyze performance of different image processing technique in both spatial and frequency domain.

BME702A.3: Apply knowledge of Mathematics and Signal Processing to solve Medical Image Processing related problems.

BME 702B: TISSUE ENGINEERING

BME 702B .1: Understand the biological requirement for tissue engineering systems and also specify the different types of biodegradable biomaterials that can be used in tissue engineering applications.

BME 702B.2: Discuss the complex interactions between biomaterials, cells and signals in biological systems using stem cells, proteomics and bioreactors.

BME 702B.3: Design and fabricate scaffolds using advanced manufacturing technologies including 3D printing for growing biological materials.

BME 702B 4: Develop engineered tissue like cardiovascular tissues and also evaluate the patterning of bio- mimetic substances.

BME 702C: MEDICAL ROBOTICS & AUTOMATION

BME702C.1: Understand and describe with the state of the art in medical robotics.

BME702C.2: Apply the knowledge to identify & describe different types of medical robots and their potential applications.

BME702C.3: Acquire the basic concepts in kinematics, dynamics and control relevant to medical robotics along with various roles that robotics can play in healthcare.

BME702C.4: Develop the analytical and experimental skills necessary to design and implement robotic assistance for both minimally invasive surgery and image-guided interventions.

BME 703A: BIOLOGICAL CONTROL SYSTEMS

BME703A.1: Define and understand the basic concept of Engineering Control System as well as Biological Control System and their related Mathematical approaches.

BME703A.2: Gain in- depth knowledge to explain the different biological process regulations and biological control processes.

BME703A.3: Identify and logically comprehend the resemblance and difference among various Biological Control Systems & Engineering Control Systems.

BME703A.4: Analyze the reasons for deviance from normal physiology, considering uniqueness of biological process regulations and interpret the biological control system to restore homeostasis.

BME703B: BIOMEMS & BIOMICROFLUIDICS

BME703B.1: Build a foundation in micro-systems engineering including basic biological/ biochemical concepts and techniques emphasizing biomedical devices.

BME703B.2: Understand material properties important for MEMS system performance, analyze dynamics of resonant micromechanical structures.

BME703B.3: Design and Development of models using microfabrication technique and simulate electrostatic and electromagnetic sensors and actuators.

BME703B.4: Design and evaluation of fluid flow in micro-fluidic devices.

BME 703C: BIOENERGY AND BIOFUELS ENGINEERING

BME 703C.1: Explain fundamental and principles for chemical and biochemical biofuel synthesis.

BME 703C.2: Differentiate between various renewable and non renewable energy resources.

BME 703C.3: Recognize the use of theoretical concepts of biofuel production technology at commercial level.

BME 791: MEDICAL INSTRUMENTS & SYSTEMS LABORATORY

BME 791.1: Understand about different types of medical equipments and demonstrate the measuring of basic medical parameters.

BME 791.2: Explain the working principle of versatile medical equipments.

BME 791.3: Demonstrate the monitoring of basic medical parameters.

BME 791.4: Recommend problem solving and service procedures for electrical equipment and apply safety standards and procedures for medical equipment.

BME 792A: MEDICAL IMAGE PROCESSING LABORATORY

BME 792A.1: Understand different application of medical image processing.

BME 792A.2: Design innovative medical image processing models using different techniques.

BME 792A.3: Apply different image processing techniques in Medical Image Processing to achieve a better result.

BME 792B: TISSUE ENGINEERING LABORATORY

BME 792B.1: Apply knowledge for preparing and maintaining cells, tissues and bone marrow in culture.

BME 792B.2: Fabricate and characterize the Biodegradable Scaffold.

BME 792B.3: Incorporate cell seeding techniques in scaffold and quantify it using analytical devices.

BME 792C: MEDICAL ROBOTICS & AUTOMATION LABORATORY

BME792C.1: Apply the knowledge to explain different types of medical robots and their potential applications.

BME792C.2: Acquire the basic concepts in kinematics, dynamics and control relevant to medical robotics along with various roles that robotics can play in healthcare.

BME792C.3: Develop the analytical and experimental skills necessary to design and implement robotic assistance for both minimally invasive surgery and image-guided interventions.

HU 802VALUES AND ETHICS IN PROFESSION

HU802.1: Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values.

HU802.2: Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories.

HU802.3: Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field.

HU802.4: Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.

HU802.5: Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.

BME 801A: ARTIFICIAL ORGAN & REHABILITATION ENGINEERING

BME801A.1: Identify various types of host tissue response with respect to different biomaterials used for design and development of artificial organ & prosthesis.

BME801A.2: Explain the working principles and design concept of various artificial organ and extra-corporeal devices used as prosthesis or rehabilitation purposes.

BME801A.3: Apply knowledge to comprehend and explain the abnormality in physiological system and analyze the performance measurement of the corresponding artificial organ.

BME801A.4: Identify the problem and Interpret physiological abnormality or malfunctioning and its impact on health & society.

BME801A.5: Acquire the knowledge and skills for providing effective solution in terms of rehabilitation engineering with respect to different impairments & disabilities.

BME 801B: BIOMEDICAL HAZARDS & SAFETY

BME 801B.1: Demonstrate the types of hazards, planning, organization and training needed to work safely with hazardous materials.

BME 801B.2: Explain the different types of hazardous exposure and its biological effects, exposure guidelines and basic workplace monitoring.

BME 801B.3: Understand the policies, safety standards in compliance with regulatory requirements and within engineering limits.

BME 801B.4: Apply knowledge to prevent workplace injury, risk management and also for safety record keeping and management.

BME 801C: TELEMEDICINE

BME 801C.1: Describe the main types of telemedical applications in current use.

BME 801C.2: Understand how technology and e-health services can be exploited strategically to create new ways of working together.

BME 801C.3: Contribute in the design, implementation and use of telemedicine and e-health systems.

BME 801C.4: Promote and introduce telemedicine and e-health services and programmes.

BME 801C.5: Identify the conditions for successful implementing telemedicine and e-health systems and services.

BME 801C.6: Apply telemedicine and e-health services in professional health work.

BME 802A: RADIOTHERAPY & NUCLEAR MEDICINE

BME 802A.1: Explain the utility of Radiotherapy & Nuclear Medicine in healthcare system.

BME 802A.2: Justify radiation safety measures drawing on theoretical knowledge and practical skill application.

BME 802A.3: Understand the principles of radiation detection and measurement - detection and electronics, counting systems and statistics and to Apply knowledge of statistical analysis to measure the limit of radiation exposure.

BME 802A.4: Gain broad knowledge of principles and applications of various radiation detectors.

BME 802A.5: Develop knowledge and practical skills related to different medical diagnostic tests and application of instrumentation used in clinical nuclear medicine.

BME 802B: LASERS & OPTICS IN MEDICINE

BME 802B.1: Explain the fundamentals and different types of laser systems.

BME 802B.2: Describe the operation of laser systems and various medical applications of Laser.

BME 802B.3: Demonstrate the basic concepts of Optical fibers and their properties.

BME 802B.4: Illustrate the construction mechanism and selection criteria of Optical fiber cables.

BME 802C: BIOMEDICAL EQUIPMENT MANAGEMENT

BME802C.1: Apply the knowledge and understanding to explain the various types of medical equipment used in healthcare, their working principles and design concept.

BME802C.2: Conduct investigation & analyze the datasheets for performance measurement of different biomedical equipment.

BME802C.3: Acquire the knowledge and skills & apply proper techniques for effective maintenance of medical equipment.

BME802C.4: Identify the problem, perform & recommend solution and service w.r.t troubleshooting for biomedical instruments.

DEPARTMENT OF CIVIL ENGINEERING

PROGRAM OUTCOMES (PO):

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science and the fundamentals of mechanical engineering to the solution of real life engineering problems.
PO 2	Problem analysis: Identify, formulate and analyze complicated engineering problems using mathematics & engineering sciences and review concerned literatures to reach substantiated conclusions
PO 3	Design/development of solutions: Design an optimized solution for complex mechanical engineering problems and formulate system components or processes for the public health and safety.
PO 4	Conduct investigations of complex problems: Use research-based knowledge for designing critical experiments, methods of analysis and interpretation of data to synthesize a valid solution of mechanical engineering problems.
PO 5	Modern tool usage: Learn modern CAD CAM software for modeling and prediction of detailed engineering phenomena and assess the appropriate results.
PO 6	The engineer and society: Apply reasoning induced by the contextual knowledge to assess societal, health, safety and cultural issues while maintaining consequent responsibilities of a Mechanical Engineering professional.
PO 7	Environment and sustainability: Understand the impact of mechanical engineering activities in environmental contexts and demonstrate the knowledge for sustainable development of the society.
PO 8	Ethics: Learn and commit to professional ethics and responsibilities by practicing consequent norms in various mechanical engineering practice
PO 9	Individual and team work: Function effectively as individual, as a member or a leader in diverse teams and multidisciplinary settings.
PO 10	Communication: Communicate effectively about technical issues with the engineering community and with society at large, comprehend and design effective documentation, make effective presentations and give or receive clear instructions.
PO 11	Project management and finance: Demonstrate knowledge and understanding of core engineering and management principles to manage projects in multidisciplinary

	environments as an individual, a member or leader of a team.
PO 12	Life-long learning: Recognize the need for life-long learning in the broadest context of technological change and have the ability to engage independently.

Program Specific Outcomes (PSOs)

PSO1	Graduates will be able to apply technical skills and modern engineering tools for civil engineering day to day practice.
PSO2	Graduates will be able to participate in critical thinking and problem solving of civil engineering field that requires analytical and design requirements.
PSO3	Graduates will be able to pursue of lifelong learning and professional development to face the challenging and emerging needs of our society.

COURSE OUTCOMES (CO):

SEMESTER I

Course Name: Mathematics-I

Course Code: M 101

M 101.1: Recall the distinctive characteristics of matrix algebra and calculus.

M 101.2: Understand the theoretical working of matrix algebra and calculus.

M 101.3: Apply the principles of matrix algebra and calculus to address problems in their disciplines.

M 101.4: Examine the nature of system using the concept of matrix algebra and calculus.

Paper Name: Physics –I

Paper Code: PH 101

PH 101.1 : Define

- De-Broglie hypothesis and Heisenberg's Uncertainty Principle
- Amplitude and Velocity Resonance
- Characteristics of LASER light
- Intrinsic and extrinsic semiconductor

PH 101.2 : Explain

- basic principles and different types of LASER and optical fibre
- structure of solids, Miller indices
- theory of matter wave, equation of motion of matter Wave
- wave function and its role in representing wave nature of matter
- p-n junction.

PH 101. 3 : Apply the knowledge of

- mechanical vibration in electrical circuits
- superposition principle in Newton's ring phenomenon, diffraction phenomenon
- quantum nature of e.m. waves for production of laser
- total internal reflection in transmitting light through optical fibres
- x-ray diffraction in crystal structure
- probability interpretation in Heisenberg's uncertainty principle

PH 101.4 : Analyze

- grating as many slit system
- role of Q factor in a resonating circuit, conditions of different types of resonance
- minimum requirements for lasing action
- importance of light as a carrier of information
- the failures of classical physics in microscopic situation and need of quantum physics

Einstein's A, B coefficients and prediction of wavelength domain of Lasing

PH 101.5 : Judge

- photoelectric effect is the inverse of X-ray production process
- different crystallographic structures according to their co-ordination number and packing factors
- the outcome of Photo-electric effect, Compton effect and Davission-Germer experiment to justify wave-particle duality of matter

Paper Name: Basic Electronics Engineering

Paper Code: EC101/EC201

EC101/EC201.1:	Students able to describe the fundamentals of Semiconductors
EC101/EC201.2:	Students able to explain V-I characteristics of P-N Junction Diode, zener diode , working of diode rectifier, clipper, clamper, and regulator circuit
EC101/EC201.3:	Students able to analyze characteristics of Bipolar junction transistor(BJT) under CE, CB, CC mode of operation and its biasing therein
EC101/EC201.4:	Students able to illustrate the operations of JFET, MOSFET and the CS,CD , CG configuration using JFET
EC101/EC201.5:	Students able to determine parameters due to effect of feedback in amplifier
EC101/EC201.6:	Students able to construct inverting amplifier circuit , non-inverting amplifier circuit ,adder circuit , integrator and differentiator circuit using Operational Amplifier IC

Paper Name: English

Paper code: (HU101)

HU101.1	Able to comprehend the basic knowledge of communication skills in English through exposure to communication theory and practice.
HU101.2	Apply the basic grammatical skills of the English language through intensive practice.
HU101.3	Able to develop listening and writing skills.
HU101.4	Able to write Official Letters, Technical report, memo, notice, minutes, agenda, resume, curriculum vitae.
HU101.5	Able to apply /illustrate all sets of English Language and Communication skills in creative and effective ways in the professional sphere of their life.

Paper Name: Physics I Lab

Paper Code: PH 191

EC191/EC291.1	Students able to identify different types of passive and active electronic components
EC191/EC291.2	Students able to demonstrate the working of CRO , Function Generator , Digital Multimeter and D.C. power supply
EC191/EC291.3	Students able to sketch the I-V characteristics of ordinary diode , Zener diode , BJTs and FET

EC191/EC291.4	Students able to construct the rectifier circuit using diode and Inverting and Non-inverting amplifiers Circuit using Op-Amp
EC191/EC291.5	Students able to determine the characteristics parameters of actual Op-Amps
EC191/EC291.6	Students able to validate the truth table of basic logic gates using digital IC

Subject Name: Workshop/Manufacturing Practices
Paper / Subject Code: ME 192/ME 292

ME 192/ME 292.1: Fabricate components with their own hands.
ME 192/ME 292.2: Get practical knowledge of the dimensional accuracies and tolerances applicable for different manufacturing processes.
ME 192/ME 292.3: Produce small devices of their interest for project or research purpose.

Course Name: Mathematics - II
Course Code: M 201

M 201.1	Use mathematical tools to evaluate multiple integrals and vector integrals
M 201.2	Apply effective mathematical tools for the solutions of ordinary differential equations that model physical processes.
M 201.3	Recall the properties of Laplace Transform to evaluate multiple integrals and their usage
M 201.4	Understand the concept of Laplace transform to solve ordinary differential equations.

Subject : Chemistry 1
Subject Code: CH 101/CH201

CH 101.1 : Able to describe the fundamental properties of atoms & molecules, atomic structure and the periodicity of elements in the periodic table
CH 101.2 : Able to apply fundamental concepts of thermodynamics in different engineering applications.
CH 101.3: Able to apply the knowledge of water quality parameters, corrosion control & polymers to different industries.
CH 101.4: Able to determine the structure of organic molecules using different spectroscopic techniques.
CH 101.5: Capable to evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations.

Paper Name: Basic Electrical Engineering
Paper Code: EE101/EE201

EE101/EE201.1. To understand Basic Electrical circuits, Power distribution and Safety measures.
EE101/EE201.2. To analyze an apply DC network theorems.
EE101/EE201.3. To analyze and apply concept of AC circuits of single-phase and three- phase.
EE101/EE201.4. To analyze and apply concepts of AC fundamentals in solving AC network problems.
EE101/EE201.5. To understand basic principles of Transformers and Rotating Machines.

SEMESTER II

Programming for Problem Solving Code: CS201

- CS201.1 Understand and differentiate among different programming languages for problem solving.
- CS201.2 Describe the way of execution and debug programs in C language.
- CS201.3 Define, select, and compare data types, loops, functions to solve mathematical and scientific problem.
- CS201.4 Understand the dynamic behavior of memory by the use of pointers.
- CS201.5 Design and develop modular programs using control structure, selection structure and file.

Subject Name: Engineering Mechanics Paper/Subject Code: ME 201

- ME 201.1: To understand the vector and scalar representation of force and moments.
- ME 201.2: To draw free-body diagrams and writes the equilibrium equations from the free-body diagram.
- ME 201.3: To analyze systems in static condition that includes frictional forces.
- ME 201.4: To locate the centroid of an area applying the concept of distributed forces.
- ME 201.5: Applications of conservation of momentum & energy principle.
- ME 201.6: Understanding of elementary concept of strength of materials applicable to mechanical system

Programming for Problem Solving Lab Code : CS291

- CS291.1: Learn the concept of DOS system commands and editor.
- CS291.2: To formulate the algorithms for simple problems and to translate given algorithms to a working and correct program.
- CS291.3: To be able to identify and correct syntax errors / logical errors as reported during compilation time and run time.
- CS291.4: To be able to write iterative as well as recursive programs.
- CS291.5: Learn the concept of programs with Arrays, Pointers, Structures, Union and Files.

Paper Name: Chemistry I Lab Paper Code: CH 291

- CH291.1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.
- CH291.2: Able to analyse and determine the composition of liquid and solid samples working as an individual and also as an team member
- CH291.3: Able to analyse different parameters of water considering environmental issues
- CH291.4: Able to synthesize drug and polymer materials.
- CH291.5: Capable to design innovative experiments applying the fundamentals of chemistry

Paper Name: Basic Electrical Engineering Laboratory
Paper Code: EE291

EE291.1: Identify and use common electrical components.

EE291.2: To develop electrical networks by physical connection of various components and analyze the circuit behavior.

EE291.3: Apply and analyze the basic characteristics of transformers and electrical machines.

Subject Name: Engineering Graphics & Design
Paper / Subject Code: ME 291

ME 291.1: Get introduced with Engineering Graphics and visual aspects of design.

ME 291.2: Know and use common drafting tools with the knowledge of drafting standards.

ME 291.3: Apply computer aided drafting techniques to represent line, surface or solid models in different engineering viewpoints.

ME 291.4: Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.

Paper Name: Lang. Lab. and Seminar Presentation
Paper Code: HU291

HU291.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.

HU291.2: Able to apply listening, speaking, reading and writing skills in societal and professional life. HU291.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.

HU291.4: Able to analyze communication behaviours.

HU291.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

SEMESTER III

PAPER NAME: NUMERICAL METHODS

PAPER CODE: M(CS) 301

M(CS) 301.1	Recall the distinctive principles of numerical analysis and the associated error measures.
M(CS) 301.2	Understand the theoretical workings of numerical techniques.
M(CS) 301.3	Apply numerical methods used to obtain approximate solutions to intractable mathematical problems such as interpolation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.
M(CS) 301.4	Select appropriate numerical methods to apply to various types of problems in engineering and science in consideration of the mathematical operations involved, accuracy requirements, and available computational resources.

PAPER NAME: PHYSICS -II PAPER

CODE: PH(CE) 301

PH(CE) 301.1: ability to a Define

- Electric and magnetic fields
- Hard and Soft magnetic materials
- Quantum tunnelling action
- Electron motion inside metal insulators and semiconductors
- Various types of defects in solid structure

PH(CE) 301.2: ability to apply the knowledge of

- Electrostatics to explain actions of dielectrics
- Magnetism and semiconductor physics in data storage
- Schrödinger equation in physical problems including semiconductor devices
- Band theory explain electrical conductivity of metal, insulators and semiconductor

PH(CE) 301.3: Ability to analyze

- Use of insulators and magnetic materials in modern electrical circuitry and storage purpose.
- The inability of direct measurement technique in quantum mechanics and role of operators
- The need of suitable theoretical methods to explain electron transport in all types of materials
- Role of defected solid structure in perspective of modern civil engineering

PH(CE) 301.4: Ability to justify

- suitable technique for detecting cracks in solid structure
- suitable transducer systems for detecting flaws in the solid structure.

PAPER NAME: SURVEYING**PAPER CODE: CE 301**

- CE 301.1 Students will summarize surveying techniques that will remain correct for long period of time.
- CE 301.2 Students will experiment about different methods using instrument such as Chain, Compass, Leveling, minor instruments like planimeter, etc.
- CE301.3 Students will learn about Area & Volume calculation.
- CE301.4 Students will evaluate about Trigonometrically leveling.
- CE301.5 Students will analyze about simple & complex problems of different instrument methods of Survey.

PAPER NAME: STRNGTH OF MATERIALS**PAPER CODE: CE 302**

- CE 302.1: Interpret the concepts of stress and strain at a point as well as the stress- strain relationships for homogenous, isotropic materials.
- CE 302.2: Analyze the stresses and strains associated with thin-wall spherical and cylindrical pressure vessels.
- CE 302.3: Demonstrate the capability to conduct experiments, as well as to analyze and interpret data
- CE 302.4: Ability to classify a component to meet desired needs within realistic constraints of safety.

PAPER NAME: BUILDING MATERIAL AND CONSTRUCTION**PAPER CODE: CE303**

- CE 303.1 Students will summaries basic knowledge about various kind of materials used in construction work.
- CE 303.2 Students will differentiate about different types of building foundation i.e. shallow and deep foundation, their mechanisms and uses.
- CE 303.3 summaries knowledge about various structural members of a building like- walls, door, window, stair, flooring, roof etc.
- CE 303.4 Extend to apply their knowledge at the time of decision making for application of structural member including material used.

PAPER NAME: ENGINEERING GEOLOGY**PAPER CODE: CE 304**

- CE304.1 Students will have knowledge about Engineering properties of Rocks and their Minerals.
- CE304.2 Student will be appraised about Dam, reservoir, tunnel

- CE304.3 Student will understand about Earthquake phenomena.
- CE304.4 Student will able to carry out Physical exploration
- CE304.5 Student will able to estimate various geological parameters by use of modern tools & techniques

Subject Name: Numerical Methods Lab
COE: M(CS) 391

- M(CS) 391.1 Understand the theoretical workings of numerical techniques with the help of C/ Matlab
- M(CS) 391.2 Execute basic command and scripts in a mathematical programming language
- M(CS) 391.3 Apply the programming skills to solve the problems using multiple numerical approaches.
- M(CS) 391.4 Analyze if the results are reasonable, and then interpret and clearly communicate the results.

PAPER NAME: ENGINEERING GEOLOGY LAB
PAPER CODE : CE 391

- CE392.1 Student should acquire knowledge about engg. Properties of rocks and their minerals.
- CE392.2 Student should be able to identify rocks and minerals
- CE392.3 Student should be able to use modern tools live microscope to explore samples.
- CE392.4 Student should be able to interpret map.

PRACTICAL SUBJECT NAME: SURVEYING
PRACTICE PAPER CODE: CE392

- CE 491.1 To interpret horizontal measurement with the help of Chain & Compass Surveying in the field.
- CE491.2 To enumerate about Plane Table surveying.
- CE491.3 To estimate vertical measurement with the help of Leveling in the field.
- CE491.4 To apply indirect methods& demonstration of minor instruments.

PAPER NAME: PHYSICS-II LAB
PAPER CODE: PH (CE) 391

- PH(CE) 391.01: define, understand and explain
- ✓ Magnetic dipoles and dipolar behaviour
 - ✓ Change in barrier potential due to change in LED
 - ✓ Dielectric features and its frequency dependent

PH(CE) 391.02: conduct experiments using

- Semiconductors (intrinsic and extrinsic)
- Solar photovoltaic cells and LDR
- Ultrasonic sound, ferroelectric materials

PH(CE) 391.03: classify

- Various types of magnetic materials
- Various types of transducer actions

PH(CE) 391.04: Function effectively as an individual, and as a member or leader in laboratory sessions

PH(CE) 391.05: communicate effectively, write reports and make effective presentation using available technology

- on presentation of laboratory experiment reports
- on presentation of innovative experiments

SEMESTER IV

Course Name: Mathematics- III

Course Code: M 401

- M 401.1 Recall the underlying principle and properties of Fourier series, Fourier transform, probability distribution of a random variable, calculus of complex variable, partial differential equation and ordinary differential equation.
- M 401.2 Exemplify the variables, functions, probability distribution and differential equations and find their distinctive measures using the underlying concept of Fourier series, Fourier transform, probability distribution of a random variable, calculus of complex variable, partial differential equation and ordinary differential equation.
- M 401.3 Apply Cauchy's integral theorem and the residue theorem to find the value of complex integration, and compute the probability of real world uncertain phenomena by indentifying probability distribution that fits the phenomena.
- M 401.4 Solve partial differential equation using method of separation of variables and ordinary differential equation using techniques of series solution and special function (Legendre's and Bessel's).
- M 401.5 Find the Fourier series and Fourier transform of functions by organizing understandings of underlying principles and also evaluate the integral using Parseval's identity.

Paper Name: VALUES AND ETHICS IN PROFESSION

Paper Code: HU 401

- HU 401.1 Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values.
- HU 401.2 Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
- HU 401.3 Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field
- HU 401.4 Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.
- HU 401. 5 Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.

Paper Name: STRUCTURAL ANALYSIS

Paper Code: CE 401

- CE401.1. Learn about determinate and indeterminate structures and determination of degree of static and kinematic indeterminacy for any type of structures.
- CE401.2. Analysis of any structure by strain energy method.
- CE 401.3. Analysis of determinate and indeterminate structures by different methods.

Paper Name: CONCRETE TECHNOLOGY
Paper Code: CE 402

- CE 402.1: Identify the functional role of ingredients of concrete.
CE 402.2: Students should be able to gather knowledge to mix design philosophy
CE 402.3: Students will be able to differentiate various types of cement used for various specific purpose.
CE 402.4: Students will be able to apply fundamental knowledge in the fresh hand hardened properties of concrete.
CE 402.5: Students will be able to design ordinary and control concretes, replacements of concrete and their specific applications.

Paper Name: SOIL MECHANICS
Paper Code: CE 403

- CE403.1 Identify the fundamental differences in engineering behavior between cohesive and cohesion less soils
- CE403.2 Compute the groundwater seepage and distribution of groundwater pressure.
- CE403.3 Calculate the applied stress beneath the ground surface.
- CE403.4 Demonstrate that you know the fundamental difference in the strength and deformation characteristics of cohesive and cohesion less soils.
- CE403.5 Analyze field and laboratory data to determine the strength and deformation properties of cohesive and cohesion less soils.
- CE403.6 Determine settlements due to consolidation of soil

Paper Name: BUILDING PLANNING AND DRAWING
Paper Code: CE 491

- CE 491.1: Preparation of simple layout of buildings
CE 491.2: Produce working drawing for individual components like door and windows etc.
CE 491.3: Develop line diagram, building section, elevation, key plan and sectional elevation.
CE 491.4: Illustrate hand drafting any parts of a building and implement the regulations for layout of plan.

Paper Name: CONCRETE LAB
Paper Code: CE 492

- CE 492.1: Identify the functional role of ingredients of concrete.
CE 492.2: Apply this knowledge to mix design philosophy to get different grade of concrete.
CE 492.3: Student should be able to test of different concrete property to specify quality of concrete.
CE 492.4: Students shall learn to work in a team to achieve the objective.

Paper Name: SOIL MECHANICS LAB – I
Paper Code: CE493

- CE493.1: Identify soils with reference to their characteristics CE493.2: Describe the behavior and effect of water in soils CE493.3: Examine modes of soil behavior
CE493.4: Calculate and plot soil strength parameters
CE493.5: Interpret different methods of improving soil stability including reference to compaction plant

Paper Name: QUANTITY SURVEYING, SPECIFICATIONS AND VALUATION

Paper Code: CE494

CE494.1: Student will be able to prepare specification for using materials of construction and its items of works.

CE494.2: Student will be able to illustrate a detailed estimation of material consumption and abstracts for entire construction projects

CE494.3: Student will learn how to analyze the rates for different items of work including labor and material.

CE494.4: Interpret fundamental concepts of valuation

CE494.5: Students will be able to identify various legal issues related to construction.

SEMESTER V

Paper Name: VALUE AND ETHICS IN PROFESSION

Paper Code: HU502

- HU502.1** Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values.
- HU502.2** understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
- HU502.3** understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field
- HU502.4** Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.
- HU502.5** acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives

Paper Name: STRUCTURAL DESIGN – I

Paper Code: CE 501

- CE501.1: Exhibit the knowledge of concrete design philosophies, by working and limit state methodology
- CE501.2: Design the structural details of beam and slab
- CE501.3: Design the structural details of column
- CE501.4: Interpret and use the I.S Code specifications
- CE501.5: Explain the detailing of the structural components

Paper Name: QUANTITY SURVEYING, SPECIFICATION AND VALUATION

Paper Code: CE502

- CE502.1: Student will be able to prepare specification for using materials of construction and its items of works.
- CE502.2: Student will be able to illustrate a detailed estimation of material consumption and abstracts for entire construction projects
- CE502.3: Student will learn how to analyze the rates for different items of works including labor and material.
- CE502.4: Interpret fundamental concepts of valuation
- CE502.5: Students will be able to identify various legal issues related to construction.

Paper Name: STRUCTURAL ANALYSIS - II

Paper Code: CE503

- CE503.1: Apply basic methods of analysis of indeterminate structures
- CE503.2: Illustrate knowledge of advanced methods of analysis of indeterminate structures
- CE503.3: To solve structural analysis problems involving analysis of two pinned arches
- CE503.4: To analyze structural analysis problems involving moving loads

Paper Name: FOUNDATION ENGINEERING

Paper Code: CE504

CE504.1: Describe bearing capacity of soil.

CE504.2: Define earth pressure theories

CE504.3: Design of shallow foundations

CE504.4: Classify piles & their loading capacity for deep foundation.

CE504.5: Compare methods & process of Geotechnical Exploration and Ground Improvement techniques

Paper Name: HYDRAULICS

Paper Code: CE505A

CE505A.1: Students will be able to recognize with different water resources terminology like hydrology, ground water, hydraulics of pipelines and open channel.

CE505A.2: Students will be able to explain and be able to use the energy and momentum equations.

CE505A.3: Students will be able to separate flow in closed pipes, and design and recommend of pipes including sizes.

CE505A.4: Students will be able to summarize pumps classification and be able to select a system curve used in pump selection.

CE505A.5: Students will be able to categorize and order pumps (single or multiple) for different hydraulic applications.

CE505A.6: Students will be able to identify with open channel cross sections, hydrostatic pressure distribution and Manning's law.

Paper Name: WATER SUPPLY AND PLUMBING

Paper Code: CE505B

CE505B.1: Student will be able to apply appropriate treatment to raw water i.e. surface water/ground water useful for domestic as well as drinking purpose, industries liquid waste and reuse of water.

CE505B.2: Student will be able to calculate and recommend the pipe- network for water supply and Sewage disposal effectively.

CE505B.3: Student may clarify and identify the impurities present in water used for domestic, different types of industrial as well as construction works.

CE505B.4: Student will able to produce and select water distribution and sewer-network system.

CE505B.5: Student will able to clarify raw water as per the standard practices.

CE505B.6: Student able to select and implement building plumbing work effectively.

Paper Name: WASTE WATER AND TREATMENT

Paper Code: CE505C

CE505C.1: Students will be able to summarize the quality parameters typically used to differentiate wastewater and judge the different classes of treated wastewater

CE505C.2: Students will be able to describe various types of process units used for preliminary, primary and secondary treatment and explain how they achieve the target level of treatment

CE505C.3: Students will be able to identify and summarize emerging technologies for advanced wastewater treatment and water recycling

CE505C.4: Students will be able to differentiate water and wastewater treatment on solid wastes management.

CE505C.5: Students will be able to choose a treatment system for a given wastewater to select a specified

end use which will conduct basic design of treatment units.

CE505C.6: Students will be able to differentiate the parameters that characterize the constituents justify in potable water and wastewater and Understand fundamental water chemistry.

Paper Name: SURVEYING PRACTICE - II

Paper Code: CE591

CE591.1: Students will be able to operate instruments like Theodolite for angle measurements

CE591.2: Students will be able to explain about different readings & calculations with the help of Total Station.

CE591.3: Students will apply the importance of precision and accuracy in taking observations CE591.4: Students will be able to pointed out Curve in the field

Paper Name: SOIL MECHANICS LAB - I

Paper Code: CE592

CE592.1: Identify soils with reference to their characteristics CE592.2: Describe the behavior and effect of water in soils CE592.3: Examine modes of soil behavior

CE592.4: Calculate and plot soil strength parameters

CE592.5: Interpret different methods of improving soil stability including reference to compaction plant

CE592.6: Illustrate a variety of laboratory tests on soils CE592.7: Calculate soil properties from test results

Paper Name: CIVIL ENGINEERING LAB

Paper Code: CE593

CE593.1: Test of beams for deflection, flexure and shear

CE593.2: Experiments on Concrete, including Mix design

CE593.3: Illustrate knowledge on Non destructive testing (NDT) equipments – Rebound hammer, Ultra sonic pulse velocity meter

Paper Name: PRESENTATION SKILL

Paper Code: MC581

MC581.1: Able to develop advanced skills of Technical Communication in English through Revision of LSRW skills learnt.

MC581.2: Able demonstrate improved interpersonal skills through Group Discussion both for organizational communication and campus recruitment drive.

MC581.3: Able to face various types of interviews.

MC581.4: Able to be industry ready professionals by various personality development programs

SEMESTER VI

PAPER NAME: ECONOMICS FOR ENGINEERS

PAPER CODE: HU603

HU603.1: To Identify alternative uses for limited resources and obtain appropriate data.

HU603.2: To introduce and expand upon key economic concepts and to place them in a real world context facilitating practical insights.

HU603.3: To establish a framework of basic economic theory which can be extended and applied at later stages of the degree program.

HU603.4: To develop an appreciation of the importance of economic forces in shaping the contemporary world.

HU603.5: To employ critical thinking skills to analyze financial data as well as the effects of different financial accounting methods on the financial statement.

HU603.6 : To apply cost accounting principles to evaluate and project business performance.

HU603.7: To be able to analyze and evaluate information for cost ascertainment, planning, control and decision making.

PAPER NAME: STRUCTURAL DESIGN -II

PAPER CODE: CE601

CE 601.1 Understand various types of design methodology as per limit and working stress method

CE 601.2 Interpret different type of connections

CE 601.3 Design compression, tension and beam members

CE 601.4 Analyze column bases

CE 601.5 Design plate girder, uses of stiffeners

CE 601.6 Interpret and uses I.S Code specifications.

PAPER NAME: ENVIRONMENTAL ENGINEERING

PAPER CODE: CE602

CE 602.1 Students will be able to understand key current environmental problems like level of pollution

CE 602.2 Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.

CE 602.3 Be able to analyze an industrial activity and identify the environmental problems.

CE 602.4 Be able to plan strategies to control, reduce and monitor pollution.

CE 602.5 Be able to select the most appropriate technique to purify and/or control the emission of pollutants.

CE 602.6 Be able to apply the basis of an Environmental Management System (EMS) to an industrial activity

PAPER NAME: HIGHWAY AND TRANSPORTATION ENGINEERING

PAPER CODE: CE603

- CE 603.1 Students will receive the introduction and history of highway engineering and economics also which will remain correct for long period of time.
Students will calculate and design the different component of the highway such as sight
CE 603.2 distances, horizontal curves, super elevation, extra widening, transition curves and gradient, vertical curves etc.
CE 603.3 Students will learn about the design criteria of pavements by IRC guideline.
CE 603.4 Students will get the knowledge about the traffic engineering and components of traffic such as traffic signs, signals, design of traffic signals design, rotary intersection, Volume studies, speed studies etc.
Students will examine and test materials of highway such as Soil, Stone Aggregate, Bitumen,
CE 603.5 Marshal Stability Test etc. Also get knowledge about construction of highway.

PAPER NAME: ENGINEERING MATERIALS

PAPERCODE: CE604A

- CE 604A.1 Understanding the behaviour and properties of materials
CE 604A.2 Understanding the features of crystals and alloys
CE 604A.3 Uses of polymers, ceramic etc

PAPER NAME: MATERIAL HANDLING

PAPERCODE: CE604C

- CE 604C.1 Ability to identify about the materials and the load characteristics.
CE 604C.2 Understanding the working principal of different types of conveyors, elevators
CE 604C.3 Understanding the working principal of Cranes, load handling instrument.
CE 604C.4 Understanding the principal and design of AGV, EOT.

PAPER NAME: OPERATIONS RESEARACH

PAPERCODE: CE605A

- CE605A.1. At the end of the course, the students will be able to identify and develop operational research models from the verbal description of the real System.
CE605A.2. Apply the mathematical tools that are needed to solve optimisation problems.
CE605A.3. Use mathematical software to solve the proposed models.
CE605A.4. Develop a report that describes the model and the solving technique, analyse the results and propose recommendations in language understandable to the decision making processes in Management Engineering.

PAPER NAME: HUMAN RESOURCE MANAGEMENT

PAPERCODE: CE605B

CE605B.1: On completion of this course the students will be able to know resource

CE605B.2: planning and management in construction.

CE605B.3: Plan and manage key human resource functions within organizations.

CE605B.4: Contribute to employee performance management and organizational Effectiveness

PAPER NAME: STUDIES ON SIX SIGMA

PAPERCODE: CE605C

- | | |
|-----------|---|
| CE 605C.1 | Understand requirement of implementation of Six Sigma. |
| CE 605C.2 | Relate Six Sigma concept to the overall business mission and objective. |
| CE 605C.3 | Understand Six Sigma methodology including DMAIC. |
| CE 605C.4 | Employ Six Sigma skills to lead a successful process improvement project for a meaningful result. |

SUBJECT NAME: TRANSPORTATION & HIGHWAY ENGINEERING LAB

PAPER CODE: CE691

- | | |
|----------|--|
| CE 691.1 | Identify the functional role of different materials of highway engineering. |
| CE 691.2 | Apply this knowledge to mix design philosophy to get different suitable B.M. & S.D.B.C. Mix. |
| CE 691.3 | Student should be able to test of existing highway and examine the quality of that highway by Benkelman Beam Test. |
| CE 691.4 | Student shall learn to work in a team to achieve the objective. |

SUBJECT NAME: STRUCTURAL DESIGN AND DETAILING

PAPER CODE: CE692

- | | |
|----------|--|
| CE 692.1 | Design principle of R.C.C. sections. Limit state method of design Loads and stresses to be considered in the design as per I.S. code provision. |
| CE 692.2 | Design & detailing of a i) simply supported R.C.C Beam ii) Continuous T- Beam |
| CE 692.3 | Student should be able to Design & Detailing of columns, isolated and combined footing. |
| CE 692.4 | Design of different units: Slab, beam column, roofing and staircase from floor plan of a multistoried frame building, typical detailing of a two way floor slab. |
| CE 692.5 | Problems on general consideration and basic concepts |
| CE 692.6 | Discussion on different loads (i.e. wind load, Dead load, live load and others) as per IS875 |
| CE 692.7 | Discussion on different loads (i.e. wind load, Dead load, live load and others) as per IS875 |
| CE 692.8 | Design & drawing of the components of a roof truss |

PRACTICAL SUBJECT NAME: SOIL MECHANICS LAB-II

PAPER CODE: CE693

- | | |
|---------|---|
| CE693.1 | Ability to calculate the compressive strength of soil |
| CE693.2 | Ability to perform shear strength of soil |
| CE693.3 | Ability to understand standard penetration test |

CE693.4 Ability to understand consolidation parameters of soil

SUBJECT NAME: COMPUTER AIDED ANALYSIS AND DESIGN

PAPER CODE: CE681

CE 681.1 Students will be able to integrate the role of graphic communication in the engineering design process

CE 681.2 Students will be able to use CAD software to generate a computer model and technical drawing for a simple, well-defined part or assembly.

CE 681.3 Students will be able to apply basic concepts to develop construction (drawing) techniques and produce 2D Orthographic Projections

CE 681.4 Understand and demonstrate dimensioning concepts and techniques

CE 681.5 Become familiar with the use of Blocks, Design Center, and Tool Palettes, Solid Modeling concepts and techniques

SEMESTER VII

PAPER NAME: WATER RESOURCE AND IRRIGATION ENGINEERING

PAPER CODE: CE701

- CE 701.1 The student will be able to acquire knowledge of Hydrological Cycle and its component.
- CE 701.2 The student will be able to understand irrigation water, use of irrigation water in farm land, different irrigation methods & effective usage of water resources.
- CE 701.3 The student will be able to analyse Ground water and Surface water conveyance system.

PAPER NAME: BRIDGE ENGINEERING

PAPER CODE: CE702A

- CE702A.1 Exhibit the knowledge of the history of bridges and know about the IRC guidelines
- CE702A.2 Design the RCC bridges of different type.
- CE702A.3 Design the Balanced Cantilever Bridges.
- CE702A.4 Design the steel bridges of different type.
- CE702A.5 Exhibit the knowledge of Composite Bridges and Cable Stayed Bridges.

PAPER NAME: PRESTRESSED CONCRETE

PAPER CODE: CE702B

- CE702B.1 The student will get basic concept of pre-stressing materials and procedures.
- CE702B.2 Detail understanding on losses in prestressed
- CE702B.3 Become familiar with IS Codes on Prestressing.
- CE702B.4 Understand design of various parts of a prestressed structure for many kind of loading.
- CE702B.5 Detail Idea on anchorage zone and composite members

PAPER NAME: STRUCTURAL DYNAMICS & EARTHQUAKE ENGINEERING

PAPER CODE: CE 702C

- CE702C.1 Student will be able know Degrees of freedom, Undamped single degree freedom system, Damped single degree freedom system
- CE702C.2 Student will be able to know about *Response of single degree freedom system due to harmonic loading*
- CE702C.3 Student will be able to know about Duhamel's Integral, Response due to constant force, Rectangular load, Introduction to numerical evaluation of Duhamel's integral of undamped system.
- CE702C.4 Student will able to know about Fundamentals: Elastic rebound theory, Plate tectonics, Definitions of magnitude, Intensity, Epicenter etc., Seismographs, Seismic zoning, Response of Simple Structural Systems
- CE702C.5 Student will able to know about *Principles of earthquake resistant design*

PAPER NAME: CONSTRUCTION PLANNING & MANAGEMENT

PAPER CODE: CE703

CE703.1 Students will be able to successfully apply business and Management skills in positions within the construction industry.

CE703.2 Use industry resources including associations and organizations,

CE703.3 Practice informed decision- making in personal and professional endovers.

CE703.4 Manage a quality construction project from start to completion while maintaining budget, schedule, and safety requirements.

PAPER NAME: TRANSPORTATION ENGINEERING

PAPER CODE: CE704A

CE 704A.1 Understanding of traffic loading pattern

CE 704A.2 Understanding of traffic engineering and traffic management

CE 704A.3 Basic concept of railway engineering

PAPER NAME: TRAFFIC ENGINEERING & PLANNING

PAPER CODE: CE704B

704B.1 Learn about basic Traffic Engineering administration.

704B.2 Students would be aware of the basic principles of speed, journey time and delay time.

704B.3 Students will be able to understand volume counts and parking surveys.

704B.4 Students would be aware of the basic principles of design, planning and management of traffic system.

704B.5 Design a pretimed signalized intersection and determine the signal splits and design an actuated signalized intersection.

PAPER NAME: URBAN PLANNING

PAPER CODE: CE704C

CE704C.1 Student will be able know the introduction of the man and Environment ,Biological and behavioral responses to human settlements,Role

CE704C.2 Student will be able to know about planning thought behind Jaipur and Delhi Studies of selected examples to include concentric city, , CIAM, linear industrial city and contemporary India Cities

CE704C.3 Student will be able to know about definitions of town planning, levels of planning and steps for preparation of a town plan

CE704C.4 Student will able to know about design of regional hubs like shopping malls, sub divisional hospitals , etc.

PRACTICAL SUBJECT NAME: ENVIRONMENTAL ENGINEERING LAB

PAPER CODE: CE791

CE791.1 Perform common environmental experiments relating to water and wastewater quality

CE791.2 Identify appropriate test for environmental problems.

CE791.3 Statistically analyze and interpret laboratorial results

CE791.4 Apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.

CE791.5 Understand and use of water and wastewater sampling procedures and sample preservations.

PRACTICAL SUBJECT NAME: CIVIL ENGINEERING PRACTICE SESSIONAL
PAPER CODE: CE782

- CE 792.1 Demonstrate capability in RCC structural details
- CE 792.2 Ability to know the steel structural details
- CE 792.3 Ability to know the sewer design
- CE 792.4 Ability to know the hydraulic structure design

SEMESTER VIII

DYNAMICS OF SOIL AND FOUNDATION

PAPER CODE: CE801A

- CE801.1** Understand the dynamic behaviour of foundations.
- CE801.2** Design foundations and isolation systems subjected to different kinds of vibrations,
- CE801.3** Determine dynamic properties of soils by using laboratory and non-destructive field tests,
- CE801.4** Design machine foundations.
- CE801.5** Assess the liquefaction potential of a given site

PAPER NAME: FINITE ELEMENT ANALYSIS

PAPER CODE: CE801B

- CE801B .1** Obtain an understanding of the fundamental theory of the FEA method.
- CE801B .2** Developed the ability to generate the governing FE equations for systems governed by partial differential equations.
- CE801B .3** Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements.

PAPER NAME: ADVANCED STRUCTURAL ANALYSIS

PAPER CODE: CE801C

- CE801C.1** Students will understand matrix method of analysis.
- CE801C.2** Students will learn to evaluate wind loads on structures.
- CE801C.3** Students will learn to analyse plates and shell structures.
- CE801C.4** Students will be able to apply knowledge of elasticity in different coordinate systems.

PAPER NAME: ADVANCED FOUNDATION ENGINEERING

PAPER CODE: CE802A

- CE802A .1** Determine suitable soil parameters
- CE802A .2** Design and analyze foundation systems using conventional methods
- CE802A .3** Design a budget and proposal for a Geotechnical investigation
- CE802A .4** Design appropriate foundation systems based on ground-investigation data and be able to select correct soil parameters for the designs
- CE802A .5** Understand limitations and uncertainties in geotechnical design

PAPER NAME: GROUND IMPROVEMENT& TECHNIQUE

PAPER CODE: CE802B

- CE802.1** Understand the different ground improvement techniques
- CE802.2** Understand the methods of stabilisation
- CE802.3** Understand the methods and properties of reinforced soil
- CE802.4** Understand the basic concepts of geosynthetics
- CE802.5** Understand the basic concept of consolidation of soil

CE802.6 Understand the concept of shear strength in soil

PAPER NAME: ADVANCED TRANSPORTATION ENGINEERING

PAPER CODE: CE802C

CE 802C.1 Learn about highway engineering and traffic engineering.
CE 802C.2 Learn about airport engineering
CE 802C.3 Learn about Railway engineering.

PAPER NAME: PAVEMENT DESIGN

PAPER CODE: CE802D

CE 802.1 Understanding the pavement performance under different circumstances
CE 802.2 Concept of pavement design.

PAPER NAME: HYDRAULIC STRUCTURE

PAPER CODE: CE803A

CE803A.1 Students will able to analyze and design hydraulic structures using relevant code of practice.
CE803A.2 Students will able to Apply the basic design principles to engineering design practice
CE 803A.3 To define basic theories of hydraulic structure design concepts- cross drainage works, canal falls etc.
CE803A.4 To define basic theories of hydraulic structure design concepts- dams, culverts, siphons etc
CE803A.5 To identify seepage under hydraulic structures and protection methods.

PAPER NAME: WATER RESOURCES MANAGEMENT AND PLANNING

PAPER CODE: CE 803B

HU803B.1 Students will identify the resources needed for each stage, including involved stakeholders, tools and supplementary materials
HU803B.2 Students will be able to provide internal stakeholders with information regarding project costs by considering factors such as estimated cost, variances and profits
HU803B.3 Students will describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths
HU803B.4 Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.

PAPER NAME: AIR & NOISE POLLUTION & CONTROL

PAPER CODE: CE803C

CE 803C.1 To learn about the air pollutants, sources and its effects.
CE 803C.2 To have a clear understanding on the air quality standards and its techniques.
CE 803C.3 To determine the fluid resistance for organic materials.
CE 803C.4 To find the Properties of air pollution and its control measures.
CE 803C.5 To learn about the effects and the sources of noise pollution.

PAPER NAME: REMOTE SENSING AND GIS

PAPER CODE: CE 803D

- CE803D.1 Student will be able know the introduction of the remote sensing and Geodetics, Triangulation, Trilateration, Tachometry etc.
- CE803D.2 Student will be able to know and apply the photogrammetric survey and analyze the problems.
- CE803D.3 Student will be able to know and apply the satellite survey. Also analyze and evaluate the problems.
- CE803D.4 Student will able to know about the astronomy and GPS system.
- CE803D.5 Student will able to know about GIS concept.

PAPER NAME:PROJECT MANAGEMENT

PAPER CODE: HU 806

- HU806.1 Students will identify the resources needed for each stage, including involved stakeholders, tools and supplementary materials
- HU806.2 Students will be able to provide internal stakeholders with information regarding project costs by considering factors such as estimated cost, variances and profits
- HU806.3 Students will describe the time needed to successfully complete a project, considering factors such as task dependencies and task lengths
- HU806.4 Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.

PAPER NAME: TECHNICAL REPORT WRITING & GROUP DISCUSSION

PAPER CODE: HU891

- HU891.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.
- HU891.2: Able to apply listening, speaking, reading and writing skills in societal and professional life.
- HU891.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.
- HU891.4: Able to analyze communication behaviours.
- HU891.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

Department of Computer Science and Engineering

Program Specific Outcomes (PSOs)

A graduate of the Computer Science and Engineering Program will demonstrate:

PSO1: Professional Skills: The ability to understand, analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO2: Problem-Solving Skills: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO3: Successful Career and Entrepreneurship: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies and research.

Program Outcome (POs)

- PO 1:** Apply knowledge of mathematics, science, engineering fundamentals in engineering specialization to get the solution of complex engineering problems.
- PO 2:** Identify, formulate, research literature and analyze complex engineering problems and formulate it to the substantiated conclusions of mathematics, natural sciences and engineering sciences.
- PO 3:** Design solutions for complex engineering problems to meet the specified needs with appropriate consideration for public health and safety, cultural, societal and environmental considerations.
- PO 4:** Use the research-based knowledge and methodologies for interpretation of data and synthesis of information to provide valid conclusions.
- PO 5:** Use the appropriate techniques, resources and modern engineering and IT tools to predict and model the complex engineering activities with an understanding of the limitations.
- PO 6:** Apply contextual knowledge reasoning to assess societal, health, safety, legal and cultural issues towards consequent responsibilities relevant to professional engineering practice.
- PO 7:** Apply the engineering solutions in societal and environmental contexts and demonstrate knowledge for sustainable development.
- PO 8:** Apply ethical principles to commit the professional ethics, responsibilities and norms for engineering practice.
- PO 9:** Effectively function as an individual, a member and leader in diverse group in multidisciplinary areas.
- PO 10:** Effectively communicate on complex engineering activities with the engineering community for effective reports and design documentation to make effective presentations and give and receive clear instructions.
- PO 11:** Use engineering and management principles to manage projects and in multidisciplinary environment as a member and leader of a team.
- PO 12:** Self-learner and clearly understand the value of lifelong learning.

1st Semester - As per 2018 Curriculum

Course Name: Mathematics-I

Course Code: M 101

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CODES	BLOOM'S TAXONOMY	DESCRIPTIONS
M 101.1	Remembering	Recall the distinctive characteristics of matrix algebra and calculus.
M 101.2	Understanding	Understand the theoretical working of matrix algebra and calculus.
M 101.3	Applying	Apply the principles of matrix algebra and calculus to address problems in their disciplines.
M 101.4	Analyzing	Examine the nature of system using the concept of matrix algebra and calculus.

Paper Name: Physics –I

Paper Code: PH 101

Course Outcome (CO) of Physics I (PH 101)

At the end of the course students' should be able to

PH 101.1 :Define

- **De-Broglie hypothesis and Heisenberg's Uncertainty Principle**
- **Amplitude and Velocity Resonance**
- **Characteristics of LASER light**
- **Intrinsic and extrinsic semiconductor**

PH 101.2 :Explain

- **basic principles and different types of LASER and optical fibre**
- **structure of solids, Miller indices**
- **theory of matter wave, equation of motion of matter Wave**
- **wave function and its role in representing wave nature of matter**
- **p-n junction.**

PH 101. 3:Apply the knowledge of

- **mechanical vibration in electrical circuits**
- **superposition principle in Newton's ring phenomenon, diffraction phenomenon**
- **quantum nature of e.m. waves for production of laser**
- **total internal reflection in transmitting light through optical fibres**

- **x-ray diffraction in crystal structure**
- **probability interpretation in Heisenberg's uncertainty principle**

PH 101.4:Analyze

- **grating as many slit system**
- **role of Q factor in a resonating circuit, conditions of different types of resonance**
- **minimum requirements for lasing action**
- **importance of light as a carrier of information**
- **the failures of classical physics in microscopic situation and need of quantum physics**
- **Einstein's A, B coefficients and prediction of wavelength domain of Lasing action**

requirement of Miller indices for describing crystallographic planes

PH 101.5:Judge

- **photoelectric effect is the inverse of X-ray production process**
- **different crystallographic structures according to their co-ordination number and packing factors**
- **the outcome of Photo-electric effect, Compton effect and Davission-Germer experiment to justify wave-particle duality of matter**

SUBJECT NAME : BASIC ELECTRONICS ENGINEERING

SUBJECT CODE : EC101

Course Outcome

On successful completion of the learning sessions of the course, the learner will be able to:

- EC101.1:** Demonstrate the concept of Conductors, Insulators, and Semiconductors based on energy-band theory and analyze relevant problems
- EC101.2:** Explain the working principles of P-N Junction Diode, zener diode and analyze their applications in the rectifier, clipper, clamper, regulator etc.
- EC101.3:** Analyze characteristics of bipolar junction transistor (BJT) under CE, CE, CC mode of operation and its biasing therein
- EC101.4:** Distinguish the operations of JFET, MOSFET and demonstrate their operations under CG, CS, CD configurations
- EC101.5:** Determine parameters in Operational Amplifier circuit design for various applications

SUBJECT NAME : COMMUNICATIVE ENGLISH

SUBJECT CODE : HU101

Course Outcome

On successful completion of the learning sessions of the course, the learner will be able to:

- HU101.1:** Able to comprehend and communicate in English through exposure to communication skills theory and practice.
- HU101.2:** Apply the basic grammatical skills of the English language through intensive practice.

- HU101.3:** Able to develop reading and comprehension skills.
HU101.4: Able to develop writing proficiency skills by writing Official Letters, Technical report, memo, notice, minutes, agenda, resume, curriculum vitae.
HU101.5: Able to apply all sets of English language and communication skills in creative and effective ways in the professional sphere of their life

Paper Name: PhysicsI Lab

Paper Code: PH 191

Course Outcome of Physics-I practical (PH 191)

At the end of the course students' will be able to

General idea about Measurements and Errors (One Mandatory):

- i) Error estimation using Slide calipers/ Screw-gauge/travelling microscope for one experiment.
- ii) Proportional error calculation using CarreyFosterBridge.

SUBJECT NAME : BASIC ELECTRONICS ENGINEERING LAB

SUBJECT CODE : EC191

Course Outcome

After completion of this course student will be able to

- EC191.1:** Identify different types of passive and active electronic components, apply signals through signal generators and measure signals using CRO, Multimeteretc
- EC191.2:** Demonstrate and analyze the characteristics for PN junction diode, Zener diode.
- EC191.3:** Describe the regulator circuit and analyze the parametric observation
- EC191.4:** Demonstrate and analyze the characteristics for BJT, FET.
- EC191.5:** Explain the limits on observation of various parameters of OP-AMP.

SUBJECT NAME : LANGUAGE LAB AND SEMINAR PRESENTATION

SUBJECT CODE : HU191

Course Outcome:

After completion of this course student will be able to

- HU191.1** Able to understand advanced skills of Technical Communication in English through Language Laboratory.
- HU191.2** Able to apply listening, speaking, reading and writing skills in societal and professional life.
- HU191.3** Able to demonstrate the skills necessary to be a competent Interpersonal communicator.
- HU191.4** Able to analyze communication behaviors.
- HU191.5** Able to adapt to multifarious socioeconomical and professional arenas with the help of effective communication and interpersonal skills.

2nd Semester - As per 2018 Curriculum

SUBJECT NAME : MATHEMATICS-II

SUBJECT CODE : M201

Course Outcome

After completion of this course student will be able to

- M201.1:** Recall the distinctive characteristics of Ordinary Differential Equations, Graph Theory and Laplace Transform to analyze the problems in Science & Technology.
- M201.2:** Demonstrate the theoretical concept of Ordinary Differential Equations, Graph Theory and Laplace Transform and understand the related working principles to solve the problems in Science & Technology.
- M201.3:** Develop mathematical model of various real world scenarios using concepts of Ordinary Differential Equations, Graph Theory and Laplace Transform and solve the same, judge if the results are reasonable, and then interpret and clearly communicate the results.

SUBJECT NAME : CHEMISTRY

SUBJECT CODE : CH201

Course Outcome

After completion of this course student will be able to

- CH201.1:** Apply fundamental concepts of thermodynamics in different engineering applications.
- CH201.2:** Apply the knowledge of chemical reactions and chemistry of fuel to industries, scientific and technical fields.
- CH201.3:** Design different types of cell and semiconductor based devices.
- CH201.4:** Apply the knowledge of corrosion to prevent different metals from Corrosion.
- CH201.5:** Identify different types of Organic reaction from the basic concept of Organic Chemistry
- CH201.6:** Prepare different types polymer materials as per their application.
- CH201.7:** Solve the industrial problem from the concept of nano science and water quality parameter

SUBJECT NAME : BASIC ELECTRICAL ENGINEERING

SUBJECT CODE : EE201

Course Outcome

After completion of this course student will be able to

- EE201.1:** Predict the behavior of any electrical and magnetic circuits.
- EE201.2:** Formulate and solve complex AC, DC circuits.
- EE201.3:** Identify the type of electrical machine used for that particular application.
- EE201.4:** Realize the requirement of transformers in transmission and distribution of electric power and other applications.
- EE201.5:** Function on multi-disciplinary teams.

SUBJECT NAME : COMPUTER FUNDAMENTALS & PRINCIPLE OF COMPUTER PROGRAMMING
SUBJECT CODE : CS201

Course Outcome

After completion of this course student will be able to

- CS201.1:** Understands the concept of anatomy of computer and differentiate among different programming languages for problem solving.
- CS201.2:** Analyze real life problems and design algorithm.
- CS201.3:** Apply the concept of conditional and iterative statements to write C programs.
- CS201.4:** Execute arrays, functions, pointers, structures and apply these concepts to solve real time problems.
- CS201.5:** Create a significant project using the concept of C programming.

SUBJECT NAME : ENGINEERING THERMODYNAMICS
SUBJECT CODE : ME201

Course Outcome

After completion of this course student will be able to

- ME201.1:** Know about thermodynamic equilibrium, heat & work transfer, First law and its application.
- ME201.2:** Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.
- ME201.3:** Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)
- ME201.4:** Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations.

SUBJECT NAME : CHEMISTRY LAB
SUBJECT CODE : CH291

Course Outcome

After completion of this course student will be able to

- CH291.1:** Measure water quality parameters like alkalinity, hardness and amount of dissolved oxygen, Chloride ions, iron etc. to be applied for industrial purpose.
- CH291.2:** Measure the conductivity and pH value of different solutions.
- CH291.3:** Fabricate polymer based materials (e.g. Bakelite) which is used to form electrical insulator parts.
- CH291.4:** Measure the oxidizing and reducing power of materials.
- CH291.5:** Synthesize nanoparticles for catalytic and medicinal activities.

SUBJECT NAME : COMPUTER FUNDAMENTALS & PRINCIPLE OF COMPUTER PROGRAMMING LAB
SUBJECT CODE : CS291

Course Outcome

After completion of this course student will be able to

- CS291.1:** Understand the concept of data types, loops, functions, array, pointers, string, structures and files.
- CS291.2:** Design flow-chart, algorithm and program logic.

CS291.3: Analyze problems, errors and exceptions.

CS291.4: Apply programming concepts to compile and debug c programs to find solutions.

SUBJECT NAME : BASIC ELECTRICAL ENGINEERING LAB

SUBJECT CODE : EE291

Course Outcome

After completion of this course student will be able to

EE291.1: Analyze the response of any electrical circuit and network

EE291.2: Troubleshoot the operation of an electrical apparatus

EE291.3: Select a suitable measuring instrument for a given application

EE291.4: Gain the knowledge of various parts and test of DC machine and transformer

EE291.5: Incorporate the measuring error with actual value and calibrate the instruments

SUBJECT NAME : ENGINEERING DRAWING & GRAPHICS

SUBJECT CODE : ME291

Course Outcome

After completion of this course student will be able to

ME291.1: Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.

ME291.2: Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.

ME291.3: Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

ME291.4: Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

SUBJECT NAME : SOFT SKILL DEVELOPMENT

SUBJECT CODE : MC281

Course Outcome

After completion of this course student will be able to

MC281.1: Understand the communication skill in social and professional fields.

MC281.2: Apply good communication skills in technical fields.

MC281.3: Develop good communication skills and all-round personalities with a mature outlook to function effectively

3rd Semester - As per 2016 Curriculum

Paper Name: Mathematics-III

Paper Code: M (CSE)301

Course Outcome(s)

On successful completion of the learning sessions of the course, the learner will be able to:

1. Recall the distinctive characteristics of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis, Algebraic Structures, Advanced graph Theory.
2. Understand the theoretical workings of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis, Algebraic Structures, Advanced Graph Theory to evaluate the various measures and forms in related field.
3. Demonstrate various real world scenarios using concepts of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis, Algebraic Structures, Advanced graph Theory.

Physics-II (Gr-B)

Code: PH 301 [For CSE and IT]

Course Outcome(s) : At the end of the course students' should be able to

PH (CSE) 301.1: state and recall

Basic postulates of Quantum Mechanics

Macro state and micro state for thermodynamic system.

Thermodynamic probability and phase space

Gauss's law, Faraday's law and Ampere's circuital law.

Properties of Nano material.

PH (CSE) 301.2: Ability to understand and explain

Quantum gates and quantum circuits.

Storage devices using magnetic material, semiconductor devices.

Quantum confinement.

Energy levels and energy states.

Distribution functions of Classical and quantum statistics.

Displacement current and need of modification of Ampere's circuital law.

Concept of quantum well, quantum wire and quantum dots.

PH (CSE) 301.3: Ability to apply the knowledge of

Quantum bit and its representation as a two level system to design quantum logic gates.

Quantum gates in designing quantum circuits.

Schrödinger equation in problems of junction diode, tunnel diode, 1-D potential box, 3-D potential box.

Magnetism and semiconductor physics in data storage.

Nano-range and various types of nano materials.

Poisson's equation and Laplace's equation to parallel plate, spherical and cylindrical capacitors.

Fermi Dirac statistics to metals and semiconductors.

PH (CSE) 301.4: Ability to Analyze

Wide spread applications of electro-magnetic theory

Physics of display devices

Which type of magnetic materials to be used for data storage purpose

Role of optoelectronic devices over usual semiconductor devices

Transverse nature of EM wave

PH (CSE) 301.5: Ability to evaluate or justify or compare

Non existence of magnetic monopole.

Under certain conditions quantum statistics collapses to classical statistics

Magnetic vector and scalar potential

Subject Name: Circuit Theory & Networks

Subject Code: EE(CSE)301

Course Outcome(s)

Upon successful completion of this course, the student will have demonstrated:

EE(CSE)301.1 Define various kinds of sources and their symbols, identify and use Kirchhoff's Laws and Networks theorem for simple circuit analyses

EE(CSE)301.2 To introduce the concept of DC & AC transient analysis

EE(CSE)301.3 Deduce expressions and perform calculations relating to the Transient response, Laplace transform, Two port network and Graph theory

EE(CSE)301.4 The Laplace's transform students will able to understand initial & final value theorem and its applications both time & s domain.

EE(CSE)301.5 Ability to solve circuits using node, branch, cutset & tie set and tree

Name of the Paper: Data Structures

Paper Code: CS301

Course Outcome(s)

On completion of the course students will be able to

- Differentiate how the choices of data structure & algorithm methods impact the performance of program.
- Solve problems based upon different data structure & also write programs.
- Identify appropriate data structure & algorithmic methods in solving problem.
- Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing
- Compare and contrast the benefits of dynamic and static data structures implementations.

Paper Name: Digital Electronics and Computer Organization

Paper Code: CS302

Course Outcome(s)

CS302.1 Realize basic gate operations and laws Boolean algebra.

CS302.2 Understand basic structure of digital computer, stored program concept and different arithmetic and control unit operations.

CS302.3 Understand basic structure of different combinational circuits- multiplexer, decoder, encoder etc.

CS302.4 Perform different operations with sequential circuits.

CS302.5 Understand memory and I/O operations.

Practical

Subject Name: Circuit Theory & Network Lab

Subject Code: EE(CSE)391

Course outcomes:

Having successfully completed the course, student will be able to:

EE(CSE)391.1: Evaluate lecture material with circuit simulation software and laboratory bench experiments

EE(CSE)391.2:Analyze the response of Step, Ramp, Impulse and Sinusoidal signals.

EE(CSE)391.3:Solve the Laplace Transform and Inverse Laplace Transform.

EE(CSE)391.4:Conduct experimental investigation and gain knowledge of Two-port networks

Name of the Paper: Data Structures Lab

Paper Code: CS391

Outcomes:

CS391.1 Choose appropriate data structure as applied to specified problem definition.

CS391.2 Handle operations like searching, insertion, deletion, traversing mechanism on various data structures.

CS391.3 Have practical knowledge on the applications of data structures.

CS391.4 Able to store, manipulate and arrange data in an efficient manner.

CS391.5 Able to implement queue and stack using arrays and linked list. Implementation of queue, binary tree and binary search tree.

Paper Name: Digital Electronics and Computer Organization Lab

Paper Code: CS392

Course outcome:

After the completion of this lab, students will be able to

CS392.1 Realize basic gate operations

CS392.2 Understand basic structure of digital computer.

CS392.3 Understand basic structure of different digital components- multiplexer, decoder, encoder etc.

CS392.4 Perform different operations with flip-flop.

CS392.5 understand arithmetic and control unit operations

Course Title: Technical Report Writing & Language Practice

Course Code: HU381

Course outcome:

By the end of the course the student should be able to

HU381.1 Understand and make use of a wide taxonomy of listening skills & sub-skills for comprehending & interpreting data in English

HU381.2:Speak in English, using appropriate vocabulary and pronunciation in contextualized situations

HU381.3:Understand and put into effective practice the pragmatics of Group Discussion

HU381.4:Understand and write a detailed technical report as per organizational needs

HU381.5: Understand and interact in professional presentations and interviews

4th Semester - As per 2016 Curriculum

Theory

Subject Name: Numerical Methods and Statistics

Subject Code: M (CSE) 401

Course Outcome(s)

On successful completion of the learning sessions of the course, the learner will be able to:

M(CSE)401.1 Recall the distinctive characteristics of various numerical techniques and the

associated error measures and Statistics.

M(CSE)401.2 Understand the theoretical workings of various numerical techniques and Statistics

to solve the engineering problems and demonstrate error.

M(CSE)401.3 Apply the principles of various numerical techniques and statistics to solve various

problems.

Subject: Environmental Science

Subject Code: HU 401

Course Outcome(s)

1. To understand the natural environment and its relationships with human activities.
2. To apply the fundamental knowledge of science and engineering to assess environmental and health risk.
3. To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.
4. Acquire skills for scientific problem-solving related to air, water, noise & land pollution.

Paper Name: Computer Architecture

Paper Code: CS401

Outcome(s)

CS401.1 Learn pipelining concepts with a prior knowledge of stored program methods

CS401.2 Learn about memory hierarchy and mapping techniques.

CS401.3 Study of parallel architecture and interconnection network.

Design & Analysis of Algorithm

Code: CS402

Outcome(s)

- CS402.1** Understand basic ideas about algorithms
- CS402.2** Apply design principles and concepts to algorithm design
- CS402.3** Analyze the efficiency of algorithms using time and space complexity theory.
- CS402.4** Develop efficient algorithms for simple computational tasks
- CS402.5** Implement algorithms in complex real life problems.

Paper: Formal Language and Automata Theory

Code: CS403

Outcome(s)

- CS403.1** To acquire the knowledge of the basics of state machines with or without output and its different classifications
- CS403.2** To understand synchronous sequential circuits as the foundation of digital system.
- CS403.3** To apply techniques of designing grammars and recognizers for several programming languages.
- CS403.4** To analyze Turing's Hypothesis as a foreword to algorithms.
- CS403.5** To perceive the power and limitation of a computer, and take decisions on computability.

Practical

Subject Name: Numerical Methods and Statistics Lab

Subject Code: M (CSE) 491

Course outcome(s)

On successful completion of the learning sessions of the course, the learner will be able to:

- M(CSE)491.1 Apply the programming skills to solve the problems using multiple numerical approaches and statistics.
- M(CSE)491.2 Analyze the results to design reports by effective presentation.

Paper Name: Computer Architecture Lab

Paper Code: CS491

Course Outcome(s):

- CS491.1 design the basic gates
- CS491.2 verify the truth table
- CS491.3 design circuit using Xilinx tools

Subject Name: Algorithms Lab

Subject Code: CS492

Course Outcome(s)

- CS492.1** Understand how several fundamental algorithms work particularly those concerned with Stack, Queues, Trees and various Sorting algorithms.

CS492.2	Understand different algorithm approach for problem solving.
CS492.3	Apply different algorithm approach to solve a problem.
CS492.4	Analyze the space & time efficiency of most algorithms
CS492.5	Design and Implement new algorithms or modify existing ones for new applications.

Subject Name: Programming with C++ Lab

Subject Code: CS493

Course Outcome

CS493.1 Students will be able to apply the computer programming techniques to solve practical problems.

493.2 Students will be able to understand the concepts and implementation of constructors and destructors.

CS493.3 Students will be able to develop software applications using object oriented programming language in C++

CS493.4 Students are able to learn C++ data types, memory allocation/deallocations, functions and pointers.

CS493.5 Students are able to apply object oriented programming concepts to software problems in C++ Outcome(s)

5th Semester - As per 2016 Curriculum

Theory

Computer Graphics

Code : CS501

Course Outcome(s)

CS501.1 To know the foundations of computer graphics.

CS501.2 To comprehend the concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics

CS501.3 To understand the comprehension of windows, clipping and view-ports object representation in relation to images displayed on screen.

CS501.4 To recognize the software utilized in constructing computer graphics applications.

Paper Name: Operating System

Paper Code: CS502

Outcome(s)

CS502.1 Describe how computing resources such as CPU, memory and I/O are managed by the operating system.

CS502.2 Analyze kernel and user mode in an operating system.

CS502.3 Solve different CPU scheduling problem to achieve specific scheduling criteria.

CS502.4 Apply the knowledge of process management, synchronization, deadlock to solve basic problems.

CS502.5 Evaluate and report appropriate design choices when solving real-world problems

Paper Name: Economics for Engineers

Paper Code: HU503

Course Outcome:

1. Apply the appropriate engineering economics analysis method(s) for problem solving: present worth, annual cost, rate-of-return, payback, break-even, benefit-cost ratio.
2. Evaluate the cost effectiveness of individual engineering projects using the methods learned and draw inferences for the investment decisions.
3. Compare the life cycle cost of multiple projects using the methods learned, and make a quantitative decision between alternate facilities and/or systems.
4. Evaluate the profit of a firm, carry out the break even analysis and employ this tool to make production decision.
5. Discuss and solve advanced economic engineering analysis problems including taxation and inflation.

DATABASE MANAGEMENT SYSTEM

Code: CS503

Course Outcomes(COs)

On completion of the course students will be able to

CS503.1 Apply the knowledge of Entity Relationship (E-R) diagram for an application.

CS503.2 Create a normalized relational database model

CS503.3 Analyze real world queries to generate reports from it.

CS503.4 Determine whether the transactions satisfy the ACID properties.

CS503.5 Create and maintain the database of an organization..

Object Oriented Programming using Java

Code: CS(IT)504A

Course Outcome(s)

CS(IT)504A.1 Design the process of interaction between Objects and System w.r.t. Object Oriented Paradigm.

CS(IT)504A.2 Acquire a basic knowledge of Object Orientation with different properties as

well as different features of Java.

CS(IT)504A.3 Analyze basic programming concepts in Java with different object related issues and various string handling functions as well as basic I/O operations.

CS(IT)504A.4 Discuss basic Code Reusability concept w.r.t. Inheritance, Package and Interface

CS(IT)504A.5 Implement Exception handling, Multithreading and Applet (Web program in java) programming concept in Java

Multimedia Technology
CS (IT) 504B

Outcome(s)

- | | |
|---------------------|--|
| CS(IT)504B.1 | Identify different media; representations of different multimedia data and data formats. |
| CS(IT)504B.2 | Analyze various compression techniques. |
| CS(IT)504B.3 | Compare various audio and video file formats. |
| CS(IT)504B.4 | Apply different coding technique for solving real world problems. |
| CS(IT)504B.5 | Choose optical storage media suitable for multimedia applications. |

Subject Name: Communication Engineering
Subject Code: CS(ECE)504C

Course Outcome(s)

- CS(ECE)504C.1** Apply the fundamental concepts of engineering principles in design issues in various communication systems.
- CS(ECE)504C.2** Inspect recent trend and performance issues for different digital modulation techniques.
- CS(ECE)504C.3** Demonstrate the concepts of sampling, Pulse Modulation techniques and their comparison.
- CS(ECE)504C.4** Design Matched filter, demonstrate the effects of Inter Symbol Interference (ISI) and compare Eye pattern analysis.
- CS(ECE)504C.5** Illustrate various types of coherent and non-coherent digital modulation techniques, analyze immunity parameters and calculate their error probabilities.
- CS(ECE)504C.6** Apply the basic concepts for analyzing the modulation techniques including amplitude modulation (AM), frequency modulation (FM) and phase modulation (PM) that are widely used in analogue communication systems in the time and frequency domains

Subject Name: Operations Research
Subject Code: CS 505A

Course Outcome(s)

On successful completion of the learning sessions of the course, the learner will be able to:

1. Recall the distinctive characteristics of different types of decision-making problem to formulate and solve a real-world problem a prototype of mathematical problem.
2. Understand the theoretical workings of appropriate decision making approaches and tools to identify the optimal strategy in competitive world.
3. Apply the principles of different Methods/Model of Operations Research to solve practical problems.

Subject Name: Computational Geometry
Subject Code: CS505B

Course Outcome(s)

1. Upon successful completion of this course, students will be able to:
2. Analyze randomized algorithms for small domain problems.
3. Use line-point duality to develop efficient algorithms.
4. Apply geometric techniques to real-world problems in graphics.
5. Solve linear programs geometrically.

Paper Name: Digital Signal Processing

Paper Code: CS505C

Course Outcome(s)

1. Determine the spectral coefficients and the Fourier series components of discrete-time signals. Determine the frequency response and the z-transform of discrete-time systems.
2. Determine the discrete Fourier transform of discrete-time signals.
3. Calculate the outputs of discrete-time systems in response to inputs and design Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) filters, and evaluate the
4. Performance to meet expected system specifications using MATLAB.
5. Demonstrate an understanding of contemporary issues by reviewing recent technical articles and establishing between the course material and the content of the article.

Practical

Computer Graphics Lab

Code: CS 591

Course Outcome(s)

- CS591.1 To draw Geometric primitives
- CS591.2 To execute scan line polygon filling
- CS591.3 To implement basic transformations on objects
- CS591.4 To implement clipping algorithm on lines

Paper Name: Operating Systems Lab

Code: CS 592

Course Outcome(s)

- CS 592.1** Analyze different aspects of Linux.
- CS 592.2** Create or design different scripts using shell programming.
- CS 592.3** Implement process, thread, semaphore concept of operating system.
- CS 592.4** Create shared memory with the implementation of reading from, write into shared memory.

Database Management System Lab

CS593

Course Outcome(s)

- On completion of the course students will be able to
- CS593.1** Understand the basic concepts regarding database, know about query processing and techniques involved in query optimization and understand the concepts of database transaction and related database facilities including concurrency control, backup and recovery.

CS593.2 Understand the introductory concepts of some advanced topics in data management like distributed databases, data warehousing, deductive databases and be aware of some advanced databases like partial multimedia and mobile databases.

CS593.3 Differentiate between DBMS and advanced DBMS and use of advanced database concepts and become proficient in creating database queries.

CS593.4 Analyze database system concepts and apply normalization to the database.

CS593.5 Apply and create different transaction processing and concurrency control applications.

Object Oriented Programming Lab

Code: CS(IT)594A

Course Outcome(s)

1. Implement the process of object orientation in java with the help of Class-object-Constructor relationship in Object Oriented Programming
2. Implement basic knowledge of code reusability with the help of Java in Object Oriented Programming.
3. Analyze the significance of various keywords w.r.t Encapsulation and polymorphism technique in OOPs. Implements exception handling in Java.
4. Discuss basic Data abstraction concept w.r.t. Inheritance, Package and Interface
5. Implement Exception handling, Multithreading and Applet (Web program in java) programming concept in Java

Multimedia Technology Lab

CS(IT)594B

Course Outcome(s)

- | | |
|---------------------|---|
| CS(IT)594B.1 | To understand about various latest interactive multimedia devices, the basic concepts about images and image formats. |
| CS(IT)594B.2 | To understand about data compression techniques, image compression techniques like JPEG, video compression techniques like MPEG, and the basic concepts about animation. |
| CS(IT)594B.3 | To develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology. |
| CS(IT)594B.4 | plan experiments to test user perception of multimedia tools |
| CS(IT)594B.5 | analyse the effects of scale and use on both presentation and lower level requirements |

Communication Engineering Lab

Code: CS (ECE) 594C

Course Outcome(s)

CS (ECE) 594C.1 Clearly distinguish between contemporary digital communication techniques.

CS (ECE) 594C.2 Demonstrate to the practical methods of the use of generating communication signals.

CS (ECE) 594C.3 Evaluate practical methods of the use of demodulation communication signals.

CS (ECE) 594C.4 Distinguish the significance of signal constellation and spectral width.

CS (ECE) 594C.5 Develop insight into the relations between the input and output signals in various stages of a transmitter and a receiver.

CS (ECE) 594C.6 Analyze the concept of analog and digital communication techniques and their applications

6th Semester - As per 2016 Curriculum

Name of the Paper: COMPUTER NETWORKS

Paper Code: CS601

Course Outcome(s)

CS601.1: Understand OSI and TCP/IP models.

CS601.2: Analyze MAC layer protocols and LAN technologies.

CS601.3: Design applications using internet protocols.

CS601.4: Implement routing and congestion control algorithms.

CS601.5: Develop application layer protocols and understand socket programming

Name of the Paper: Microprocessors & Microcontrollers

Paper Code: CS602

Course Outcomes

CS602.1 To acquire the knowledge of hardware details of 8085 and 8086 microprocessor with the related signals and their implications

CS602.2 To develop skill in assembly Language programming of 8085

CS602.3 To understand the concept and techniques of designing and implementing interfacing of microprocessor with memory and peripheral chips involving system design

CS602.4 To acquire the knowledge of the 8051 architecture and its programming

CS602.5 To analyze the performance of computers and its architecture to real-life applications

Paper Name: Software Engineering

Code: CS603

Course Outcomes

CS 603.1 To identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements

CS 603.2 To analyze, elicit and specify software requirements through a productive working relationship with various stakeholders of the project

- CS 603.3** To design applicable solutions in one or more application domains using software engineering approaches that integrates ethical, social, legal and economic concerns.
- CS 603.4** To develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice.
- CS 603.5** To identify modern engineering tools necessary for software project management, time management and software reuse, and an ability to engage in life-long learning.

Name of the Paper: Compiler Design

Paper Code: CS604A

Course Outcomes:

- CS604A .1. To illustrate the basic concept of compilers and discuss on the components as well as the strengths and weaknesses of various phases of designing a compiler.
- CS604A .2. To formulate the theories of creating simple compilers using C programming languages.
- CS604A .3. To design and analyze algorithms for syntactic and semantic analysis of the process of designing compilers.
- CS604A .4. To explain the role of finite automata in compiler design.
- CS604A .5. Identify the similarities and differences among various parsing techniques and grammar transformation techniques

Paper Name: ROBOTICS

Code:CS604B

Contacts:3L

Credits:3

Allotted hours:35L

Course Outcome: After the successful completion of this course, the student will be able to:

- CS 604B.1 To describe and explain the microcontrollers used the in robots
- CS 604B.2. To design the software and build the prototype of robots
- CS 604B.3. To apply localization and mapping aspects of mobile robotics.
- CS 604B.4. To demonstrate self-learning capability.

Name of the Paper: Simulation and Modeling

Paper Code: CS604C

Course Outcome(s)

On completion of the course students will be able to

- CS604C .1.** Student will be able to summarize the issues in Modelling and Simulation.
- CS604C.2.** Student will be able to explain the System Dynamics & Probability concepts in Simulation.

CS604C.3. Student will be able to solve the Simulation of Queuing Systems

CS604C.4. Student will be able to analyze the Simulation output.

CS604C.5. Student will be able to identify the application area of Modelling and Simulation, and apply them.

Paper Name: Pattern Recognition

Code: IT(CSE)605A

Course Outcome (CO)

After the completion of four years of B.Tech., students will be able to:

IT(CSE)605A.1 Explain and compare a variety of pattern classification methods.

IT(CSE)605A.2 Analyze different clustering and classification problem and solve using different pattern recognition technique.

IT(CSE)605A.3 Apply performance evaluation methods for pattern recognition, and can do comparisons of techniques

IT(CSE)605A.4 Apply pattern recognition techniques to real-world problems such as document analysis and recognition.

IT(CSE)605A.5 Implement simple pattern classifiers, classifier combinations, and structural pattern recognizers.

Paper Name: Distributed Operating System

Code: IT(CSE)605B

Outcome(s)

On successful completion of the learning sessions of the course, the learner will be able to:

IT(CSE)605B.1 Define the distributed operating system, architecture, goal of DOS and its designing issues.

IT(CSE)605B.2 Explain the technique of inter-process communication.

IT(CSE)605B.3 Analyze the need of local clock instead of global clock and the different mutual exclusion and deadlock algorithms.

IT(CSE)605B.4 Explain the distributed file system and shared memory architecture.

IT(CSE)605B.5 Develop the idea about the designing policy of different distributed operating system like AMOEBA, MACH, DCE

Name of the Paper: Distributed Database

Paper Code: IT(CSE)605C

Course Outcome(s)

On completion of the course students will be able to

IT(CSE)605C.1: Describe database management system internals, understand and describe internal algorithms in detail.

IT(CSE)605C.2: Identify and be able to use recent and advanced database techniques (e.g. in concurrency control, buffer management, and recovery

IT(CSE)605C.3: Decide on configuration issues related to database operation and performance. Identify which parameters are suitable and what are its implications

IT(CSE)605C.4: Analyze and optimize transactional code, identifying causes of possible anomalies and correct them.

IT(CSE)605C.5: Decide on optimization issues given a known database workload, by manipulating indexes, choosing more adequate data types, and modifying queries.

Name of the Paper: Computer Vision

Paper Code: IT(CSE)605(D)

Course Outcome:

On completion of the course students will be able to

- | | |
|----------------------|--|
| IT(CSE)605D.1 | Understand fundamental image processing techniques required for computer vision |
| IT(CSE)605D.2 | Understand 3D vision techniques |
| IT(CSE)605D.3 | Implement boundary tracking techniques |
| IT(CSE)605D.4 | Apply chain codes and other region descriptors to perform shape analysis |
| IT(CSE)605D.5 | Apply Hough Transform for line, circle, and ellipse detections and develop applications using computer vision techniques |

Name of the Paper: Data Warehousing & Data Mining

Paper Code: IT(CSE)606A

Course Outcome(s)

On completion of the course students will be able to

IT(CSE)606A .1. Student will be able to summarize the issues in Data mining.

IT(CSE)606A.2. Student will be able to explain and give examples of Data warehousing.

IT(CSE)606A.3. Student will be able to solve Business problems and can apply the Data mining in real applications in industry.

IT(CSE)606A.4. Student will also be able to implement the classical algorithms in data mining and data warehousing.

IT(CSE)606A.5. identify the application area of algorithms, and apply them

Name of the Paper: Digital Image Processing

Paper Code: IT(CSE)606B

Course Outcomes

IT(CSE)606B.1 To acquire the knowledge of basic preprocessing techniques in monochrome and color images.

IT(CSE)606B.2 To develop skill in concepts of image enhancement like linear and non linear spatial filters using MATLAB.

IT(CSE)**606B.3** To understand the concept and techniques of simple image processing projects using different methods of restoration.

IT(CSE)**606B.4** To acquire the knowledge of the various segmentation algorithms for practical applications.

IT(CSE)**606B.5** To analyze the performance of Lossless and Lossy compression techniques in images.

Name of the Paper: E Commerce & ERP

Paper Code: IT(CSE)606C

Course Outcome(s)

On completion of the course students will be able to

IT(CSE)**606C.1** **Define** and **differentiate** various types of Ecommerce.

IT(CSE)**606C.2** **Define** and **describe** E-business and its Models.

IT(CSE)**606C.3** **Describe** Hardware and Software Technologies for Ecommerce.

IT(CSE)**606C.4** **Understand** the basic concepts of ERP and **identify** different technologies used in ERP.

IT(CSE)**606C.5** **Apply** different tools used in ERP

Practical

Name of the Paper: COMPUTER NETWORKS Lab

Paper Code: CS691

Course Outcome(s)

CO1: Demonstrate the socket program using TCP & UDP.

CO2: Develop simple applications using TCP & UDP.

CO3: Develop the code for Data link layer protocol simulation.

CO4: Examine the performances of Routing protocol.

CO5: Experiment with congestion control algorithm using network simulator

Name of the Paper: Microprocessors & Microcontrollers Lab

Paper Code: CS692

Course Outcomes

CS692.1 To understand and apply the fundamentals of assembly level programming of microprocessors and microcontroller

CS692.2 To work with standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.

CS692.3 To troubleshoot interactions between software and hardware

CS692.4 To analyze abstract problems and apply a combination of hardware and software to address the problem

CS692.5 To use standard test and measurement equipment to evaluate digital interfaces

Name of the Paper: Software Engineering Lab

Paper Code: CS693

Course Outcomes

CS693.1 To handle software development models through rational method.

CS693.2 To prepare SRS document, design document, test cases and software configuration management and risk management related document.

CS693.3 To Develop function oriented and object oriented software design using tools like rational rose.

CS693.4 To perform unit testing and integration testing

CS 693.5 To apply various white box and black box testing techniques

7th Semester - As per 2016 Curriculum

Theory

Name of the Paper: Artificial Intelligence

Paper Code: CS701

Course Outcome(s)

On completion of the course students will be able to

CS701.1 Understand the concepts of Artificial intelligence

CS701.2 Analyze the dimensions along which agents and environments vary, along with key functions that must be implemented in a general agent

CS701.3 Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing

CS701.4 Represent knowledge of the world using logic and **infer** new facts from that Knowledge.

CS701.5 Demonstrate working knowledge in PROLOG in order to write simple PROLOG programs and **explore** more sophisticated PROLOG code on their own.

Paper Name: Values and Ethics in Profession

Paper Code: HU702

Course Outcome: On Completion of this course student will be able to

- | | |
|------|--|
| CO.1 | Understand the core values that shape the ethical behavior of an engineer and Exposed awareness on professional ethics and human values. |
| CO.2 | Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories |
| CO.3 | Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field |
| CO.4 | Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer. |
| CO.5 | Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives |

Paper Name: Soft Computing

Code: CS 702A

Course Outcomes

- **CS702A.1** To acquire the knowledge of soft computing and hard computing

- **CS702A.2** To develop skill in soft computing methodology
- **CS702A.3** To understand the concept and techniques of designing and implementing of soft computing methods in real world problem
- **CS702A.4** To acquire the knowledge of the fuzzy Neural network and Genetic Language
- **CS702A.5** To analyze and optimized the problem of real-life applications

Name of the Paper: Natural Language Processing

Paper Code: CS702B

Course Outcome(s)

CS702B.1 Understand the fundamental concept of NLP, Regular Expression, Finite State Automata along with the concept and application of word tokenization, normalization, sentence segmentation, word extraction, spell checking in the context of NLP.

CS702B.2 Understand the concept of Morphology such as Inflectional and Derivational Morphology and different morphological parsing techniques including FSTs.

CS702B.3 Understand the concepts related to language modeling with introduction to N-grams, chain rule, smoothing, Witten Bell discounting, backoff, deleted interpolation, spelling and word prediction and their evaluation along with the concept of Markov chain, HMM, Forward and Viterbi algorithm, POS tagging.

CS702B.4 Understand the concept of different text classification techniques, sentiment analysis, concepts related to CFG in the context of NLP.

CS702B.5 Understand the concept of lexical semantics, lexical dictionary such as WordNet, lexical computational semantics, distributional word similarity and concepts related to the field of Information Retrieval in the context of NLP.

Name of the Paper: Web Technology

Paper Code: CS702C

Course Outcome(s) (CO):

CS702C.1 To understand the notions of World Wide Web(www), Internet, HTTP Protocol, Web Browsers, Client-Server etc.

CS702C.2 To develop interactive web pages using HTML, DHTML and CSS.

CS702C.3 To procure the knowledge of different information interchange formats like XML.

CS702C.4 To design web applications using scripting languages like JavaScript, CGI, PHP.

CS702C.5 To acquire the server side programming concepts using servlet, JSP and .Net framework.

Paper Name: Cloud Computing

Code:CS703A

COURSE OUTCOMES

After completion of course, students would be able to:

CS703A.1 Articulate the business model concepts, architecture and infrastructure of cloud computing, including cloud service models and deployment models.

CS703A.2 Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms

CS703A.3 Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications

CS703A.4 Analyze the core issues of cloud computing such as security, privacy, interoperability, and its impact on cloud application

Name of the Paper: Data Analytics

Paper Code: CS703B

Course Outcome(s)

CS703B.1: Identify the difference between structured, semi-structured and unstructured data.

CS703B.2: Summarize the challenges of big data and how to deal with the same.

CS703B.3: Explain the significance of NoSQL databases.

CS703B.4: Explain about Hadoop Ecosystem.

CS703B.5: Identify the difference between Pig and Hive

Name of the Paper: Sensor Network and IOT

Paper Code: CS703C

Course Outcomes

CS703C.1 To analyze basic protocols in wireless sensor network

CS703C.2 To understand the concepts of Internet of Things

CS703C.3 To recognize the M2M communication protocols

CS703C.4 To design IoT applications in different domain on embedded platform and be able to analyze their performance

Name of the Paper: Distributed Algorithms

Paper Code: CS 704(A)

Course Outcome(s)

CS-704(A).1: Acquire a basic concept of different models and organizational structure of distributed algorithm

CS-704(A).2: Analyze basic idealization of synchronous, asynchronous and shared allocation techniques

CS-704(A).3: Understand different models of synchronous, asynchronous allocation techniques in the light of implementation in network and memories.

CS-704(A).4: Explain the concepts of shared storage, data links and agreement mechanisms along with its failure detection technique for algorithms.

CS-704(A).5: Concept of advance application and development of partial and distributed algorithms in timed based proof, protocols and methods along with its perspective in modern computing era.

Name of the Paper: Bio-informatics

Paper Code: CS704B

Course Outcomes

CS704B.1 To acquire the knowledge of Bioinformatics technologies with the related concept of DNA, RNA and their implications

CS704B.2 To develop idea in MOLECULAR BIOLOGY

CS704B.3 To understand the concept and techniques of different types of Data Organization and Sequence Databases with different types of Analysis Tools for Sequence Data Banks

CS704B.4 To acquire the knowledge of the DNA SEQUENCE ANALYSIS

CS704B.5 To analyze the performance of different types of Probabilistic models used in Computational Biology

Name of the Paper: Cryptography and Network Security

Paper Code: CS704C

Course Outcomes

- **CS704C.1** To understand the basic concepts in cryptography
- **CS704C.2** To apply the deployment of different encryption techniques to secure messages in transit across data networks
- **CS704C.3** To discuss various techniques used to assure Integrity and Authentication
- **CS704C.4** To analyze diverse security measures and issues in practice

Practical

Course Code: CS791

Course Name: Artificial Intelligence Lab

Course Outcome(s):

On completion of the course students will be able to

- CS793C.1 Learn the concept of simple programming using PROLOG.
- CS793C.2 Understand the concept of AI based programs using PROLOG.
- CS793C.3 Develop the capability to represent various real life problem domains using logic based techniques

Paper Name: Soft Computing Lab

Code: CS 792A

Course Outcomes

- **CS792A.1** To understand the concept and techniques of designing and implementing of soft computing methods in real world problem
- **CS792A.2** To acquire the knowledge of the fuzzy Neural network and Genetic Language
- **CS792A.3** To analyze and optimized the problem of real-life applications

Name of the Paper: Natural Language Processing Lab

Paper Code: CS792B

Course Outcome(s)

On completion of the course students will be able to

CS792B.1 Access text corpora and lexical resources and process of raw text.

CS792B.2 Write structured programs for categorizing and tagging of words, segmentation of sentences.

CS792B.3 Classify text and extract information from it.

CS792B.4 Analyze sentence structure and build feature based grammar.

CS792B.5 Analyze meaning of sentences and to manage linguistic data.

Name of the Paper: Web Technology Lab

Paper Code: CS792C

Course Outcomes

CS792C.1 To develop interactive web pages using HTML, DHTML, CSS and image map.

CS792C.2 To procure the knowledge of information interchange formats like XML.

CS792C.3 To validate fields of web pages using scripting languages like JavaScript.

CS792C.4 To develop web applications using PHP and ASP.net.

CS792C.5 To acquire the server side programming concepts using servlet, JSP.

8th Semester - As per 2016 Curriculum

Theory

Paper Name: Principles of Management

Course Outcomes:

1. To develop ability to critically analyze and evaluate a variety of management practices in the contemporary context
2. To understand and apply a variety of management and organizational theories in practice
3. To be able to mirror existing practices or to generate their own innovative management competencies required for today's complex and global workplace
4. To be able to critically reflect on ethical theories and social responsibility ideologies to create sustainable organizations

Name of the Paper: Mobile Computing

Paper Code: CS801A

Course Outcome(s)

CS801A.1 Analyze the working of modern communication technologies.

CS801A.2 Demonstrate the various routing algorithms for both infrastructure based and ad hoc networks.

CS801A.3 Develop mobility and bandwidth management in cellular network

CS801A.4 Design and build an energy efficient and secure mobile computing environment using heterogeneous wireless technologies

CS801A.5 Identify the technical issues related to recent mobile computing environment.

Name of the Paper: Human computer Interaction

Paper Code: CS801B

Course Outcomes: Upon Completion Of The Course, The Student Should Be Able To:

CS801B.1 Design Effective Dialog For HCI.

CS801B.2 Design Effective HCI For Individuals And Persons With Disabilities.

CS801B.3 Assess The Importance Of User Feedback.

CS801B.4 Explain The HCI Implications For Designing Multimedia/ Ecommerce/ E-Learning Web Sites.

CS801B.5 Develop Meaningful User Interface.

Name of the Paper: Cyber law and Security Policy

Paper Code: CS801C

Course Outcomes

CS801C.1 Make Learner Conversant With the Social and Intellectual Property Issues Emerging From 'Cyberspace.

CS801C.2 Give Learners In Depth Knowledge of Information Technology Act And Legal Frame Work of Right to Privacy, Data Security and Data Protection.

CS801C.3 Develop the understanding of relationship between commerce and cyberspace

CS801C.4 To be familiar with network security threats and countermeasures.

CS801C.5 To be familiar with advanced security issues and technologies.

Name of the Paper: Parallel Computing

Paper Code: CS802A

Course Outcome(s)

CS802A.1: Explain the range of requirements that modern parallel systems have to address.

CS802A 2: Define the functionality that parallel systems must deliver to meet some need.

CS802A.3: Articulate design tradeoffs inherent in large-scale parallel system design.

CS802A.4: Demonstrate the potential run-time problems arising from the concurrent operation of many (possibly a dynamic number of) tasks in a parallel system.

CS802A.5: Justify the presence of concurrency within the framework of a parallel system.

Name of the Paper: Machine Learning

Paper Code: CS802B

Course Outcomes

CS802B.1 Have a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.

CS802B.2 Have an understanding of the strengths and weaknesses of many popular machine learning approaches.

CS802B.3 Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised, un-supervised learning and reinforcement learning.

CS802B.4 Be able to design and implement various machine learning algorithms in a range of real-world applications.

Name of the Paper: Real Time Operating System

Paper Code: CS802C

Course Outcome(s)

CS802C .1. Student will be able to summarize the issues in real time computing.

CS802C.2. Student will be able to explain and give examples of real time operating systems.

CS802C.3. Student will be able to solve scheduling problems and can apply them in real time applications in industry.

CS802C.4. Student will also be able to design an RTOS and will be able to interpret the feasibility of a task set to accomplish or not.

CS802C.5. Analyze the situation of fault occurrence and will be able to apply solutions accordingly.

Name of the Paper: Advanced Computer Architecture

Paper Code: CS802D

Course Outcome(s)

CS802D.1 To acquire the knowledge of parallelism and pipelining

CS802D.2 To develop knowledge of parallel processing

CS802D.3 To combine the concept and design techniques of interconnection network

CS802D.4 To acquire the knowledge of shared memory architecture

CS802D.5 To describe the fundamentals of embedded system architecture

Course Name: Mathematics-I

Course Code: M 101

Total contact Hours: 48

Credit: 4

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CODES	DESCRIPTIONS
M 101.1	Recall the distinctive characteristics of matrix algebra and calculus.
M 101.2	Understand the theoretical working of matrix algebra and calculus.
M 101.3	Apply the principles of matrix algebra and calculus to address problems in their disciplines.
M 101.4	Examine the nature of system using the concept of matrix algebra and calculus.

CH 101: CHEMISTRY

Contact: 3:0:0

Credits: 3

Lectures: 36

COURSE OUTCOME:

CO 1: Able to describe the fundamental properties of atoms & molecules, atomic structure and the periodicity of elements in the periodic table

CO 2: Able to apply fundamental concepts of thermodynamics in different engineering applications.

CO 3: Able to apply the knowledge of water quality parameters, corrosion control & polymers to different industries.

CO 4: Able to determine the structure of organic molecules using different spectroscopic techniques.

CO 5: Capable to evaluate theoretical and practical aspects relating to the transfer of the production of chemical products from laboratories to the industrial scale, in accordance with environmental considerations

EE101	Basic Electrical Engineering	3L:0T:0P	3 credits
--------------	-------------------------------------	-----------------	------------------

Course Outcomes:

At the end of this course, students will able to

- EE101/201.1.** Understand Basic Electrical circuits, Power distribution and Safety measures.
- EE101/201.2.** Analyze and apply DC network theorems.
- EE101/201.3.** Analyze and apply concept of AC circuits of single-phase and three-phase.
- EE101/201.4.** To analyze and apply concepts of AC fundamentals in solving AC network problems.
- EE101/201.5.** To understand basic principles of Transformers and Rotating Machines.

HU 101: ENGLISH

Contact: 2:0:0

Credits: 2

Lectures: 24

Course outcome:

CO	Statement
CO1	Able to comprehend the basic knowledge of communication skills in English through exposure to communication theory and practice.

CO2	Apply the basic grammatical skills of the English language through intensive practice.
CO3	Able to develop listening and writing skills.
CO4	Able to write Official Letters, Technical report, memo, notice, minutes, agenda, resume, curriculum vitae.
CO5	Able to apply /illustrate all sets of English Language and Communication skills in creative and effective ways in the professional sphere of their life.

CH 191: CHEMISTRY LAB

Contact: 0:0:3

Credits: 1.5

COURSE OUTCOME:

CO1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CO2: Able to work as an individual also as a team member

CO3: Able to analyse different parameters of water considering environmental issues

CO4: Able to synthesize nano and polymer materials.

CO5: Capable to design innovative experiments applying the fundamentals of chemistry

EE191	Basic Electrical Engineering Laboratory	0L:0T:3P	1.5 credits
--------------	--	-----------------	--------------------

Course Outcomes:

EE191.1	Identify and use common electrical components.
EE191.2	To develop electrical networks by physical connection of various components and analyze the circuit behavior.

EE191.3	Apply and analyze the basic characteristics of transformers and electrical machines
----------------	---

ME 191: Engineering Graphics & Design

Contact: 0:0:3

Credit: 1.5

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics

Course Outcomes:

Upon successful completion of this course, the student will be able to:

ME 291.1. Get introduced with Engineering Graphics and visual aspects of design.

ME 291.2. Know and use common drafting tools with the knowledge of drafting standards.

ME 291.3. Apply computer aided drafting techniques to represent line, surface or solid models in different engineering viewpoints.

ME 291.4. Produce part models; carry out assembly operation and show working procedure of a designed project work using animation.

M 201: Mathematics - II

Contact: 4:0:0

Credit: 4

Lecture: 48

Course Outcomes (COs):

On successful completion of the learning sessions of the course, the learner will be able to:

CODES	DESCRIPTIONS
M 201.1	Use mathematical tools to evaluate multiple integrals and vector integrals
M 201.2	Apply effective mathematical tools for the solutions of ordinary differential equations that model physical processes.
M 201.3	Recall the properties of Laplace Transform to evaluate multiple integrals and their usage
M 201.4	Understand the concept of Laplace transform to solve ordinary differential equations.

PH 201: Physics –I

Contacts: 3:0:0

Credit: 3

Lecture: 36

Course Outcome

At the end of the course students should be able to

PH 201.1:	Define De-Broglie hypothesis and Heisenberg's Uncertainty Principle, Amplitude and Velocity Resonance, Characteristics of LASER light, Intrinsic and extrinsic semiconductor
PH 201.2:	Explain the basic principles and different types of LASER and optical fibre, structure of solids, Miller indices, theory of matter wave, equation of motion of water Wave, wave function and its role in representing wave nature of matter, p-n junction.
PH 201.3:	Apply the knowledge of mechanical vibration in electrical circuits, superposition principle in Newton's ring phenomenon, diffraction phenomenon, quantum nature of e.m. waves for production of laser, total internal reflection in transmitting light through optical fibres x-ray diffraction in crystal structure and probability interpretation in Heisenberg's uncertainty principle
PH 201.4:	Analyze grating as many slit system, role of Q factor in a resonating circuit, conditions of different types of resonance, minimum requirements for lasing action importance of light as a carrier of information, the failures of classical physics in microscopic situation and need of quantum physics, Einstein's A, B coefficients and prediction of wavelength domain of

	Lasing action and requirement of Miller indices for describing crystallographic planes
PH 201.5:	Judge photoelectric effect is the inverse of X-ray production process, different crystallographic structures according to their co-ordination number and packing factors, the outcome of Photo-electric effect, Compton effect and Davission-Germer experiment to justify wave-particle duality of matter

EC 201: BASIC ELECTRONICS ENGINEERING

Contact: 3:0:0

Credits: 3

Lectures: 36

COURSE OUTCOME:

CO1: Study PN junction diode, ideal diode, diode models and its circuit analysis, application of diodes and special diodes.

CO2: Learn how operational amplifiers are modelled and analysed, and to design Op-Amp circuits to perform operations such as integration differentiation on electronic signals.

CO3: Study the concepts of both positive and negative feedback in electronic circuits.

CO4: Develop the capability to analyse and design simple circuits containing non-linear elements such as transistors using the concepts of load lines, operating points and incremental analysis.

CS 201: PROGRAMMING FOR PROBLEM SOLVING

Contacts: 3:0:0

Lectures: 36

Credits: 3

Course Outcome(s):

On completion of the course students will be able to

CS201.1	Understand and differentiate among different programming languages for problem solving.
CS201.2	Describe the way of execution and debug programs in C language.
CS201.3	Define, select, and compare data types, loops, functions to solve mathematical and scientific problem.
CS201.4	Understand the dynamic behavior of memory by the use of pointers.
CS201.5	Design and develop modular programs using control structure, selection structure and file.

ME 201: Engineering Mechanics

Contact: 3:0:0

Credit: 3

Lecture: 36

Course Outcome(s):

Student will able to:

ME 201.1	Understand the vector and scalar representation of force and moments and elementary concept of strength of materials applicable to mechanical system design.
ME 201.2	Draw free-body diagrams and writes the equilibrium equations from the free-body diagram
ME 201.3	Analyze systems in static condition that includes frictional forces
ME 201.4	Locate the centroid of an area applying the concept of distributed forces
ME 201.5	Apply of conservation of momentum & energy principle

CS291: Programming for Problem Solving Lab

Contacts: 0:0:3

Credits: 1.5

Course Outcome(s):

On completion of the course students will be able to

CS291.1	Learn the concept of DOS system commands and editor.
CS291.2	To formulate the algorithms for simple problems and to translate given algorithms to a working and correct program.
CS291.3	To be able to identify and correct syntax errors / logical errors as reported during compilation time and run time.
CS291.4	To be able to write iterative as well as recursive programs.
CS291.5	Learn the concept of programs with Arrays, Pointers, Structures, Union and Files.

PH 291: PHYSICS-I LAB

Contacts: 0:0:3

Credits: 1.5

Course Outcomes:

Student will able to:

PH 291.1	Define, understand and explain Error estimation, Proportional error calculation, superposition principle in Newton's ring, Fresnel's biprism, laser diffraction, Basic circuit analysis in LCR circuits
PH 291.2	Conduct experiments using LASER, Optical fibre, Interference by division of wave front, division of amplitude, diffraction grating, polarization of light, Quantization of electronic energy inside an atom, Torsional pendulum
PH 291.3	Function effectively as an individual, and as a member or leader in laboratory sessions
PH 291.4	Communicate effectively, write reports and make effective presentation using available technology, on presentation of laboratory experiment reports, on presentation of innovative experiments

EC 291: BASIC ELECTRONICS ENGINEERING LAB

Contact: 0:0:3

Credits: 1.5

COURSE OUTCOME:

CO1: Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.

CO2: Analyse the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.

CO3: Determination of input-offset voltage, input bias current and Slew rate, Common- mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.

CO4: Able to know the application of Diode, BJT & OPAMP.

ME 292: Workshop/Manufacturing Practices

Contact: 0:0:3

Credit: 1.5

Course Outcomes:

Upon completion of this laboratory course, students will be able to

ME 292.1.	Fabricate components with their own hands.
ME 292.2.	Get practical knowledge of the dimensional accuracies and tolerances applicable for different manufacturing processes.
ME 292.3.	Produce small devices of their interest for project or research purpose.

HU 291: Language Lab.

Contact: 0:0:2

Credit: 1

Course Outcome:

HU 291.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.

HU 291.2: Able to apply listening, speaking, reading and writing skills in societal and professional life.

HU 291.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.

HU 291.4: Able to analyze communication behaviours.

HU 291.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
3rd	MATHEMATIC S-III (M 301)	CO.M 301.1	Apply the knowledge of Linear Algebra, Vector Spaces, Linear Transformations, Rank and Echelon matrices,
		CO.M 301.2	Analyze the Homogeneous linear equations, Basic Solutions, Similarity, Symmetric matrices, Diagonalization, Quadratic forms
		CO.M 301.3	Identify the problems on Rotation of co-ordinates, Orthogonal Transformations.
		CO.M 301.4	Solve problems on Probability Theory and Applications
		CO.M 301.5	Analyze the Functions of Complex variables, Cauchy-Riemann equations,
		CO.M 301.6	Explain the Properties of analytic functions, Conformal mapping, Properties of PN sequences, Generation of PN sequences application of PN sequences.
3rd	Numerical Methods (M(CS)301)	CO.M(CS301).1	Analyze real world scenarios to recognize when different mathematical techniques are to be used for solving a problem.
		CO.M(CS301).2	Modeling a system or situation (using technology, if appropriate) in order to solve the problems using multiple approaches.
		CO.M(CS301).3	Judge if the results are reasonable, and then interpret and clearly communicate the results.
		CO.M(CS301).4	Appreciate concepts of numerical methods, understand and be able to apply the concepts to solve different real-world problems like optimisation, interpolation etc.
		CO.M(CS301).5	Implement the techniques of numerical methods within the field of mathematics, science, engineering and management.
		CO.M(CS301).6	Build an understanding of how abstract foundations support and frequently evolve into concrete technologies.

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
3rd	Data structure (CS(ECE)301)	CO.CS(ECE)301.1	Analyze the different algorithm and can find their best case, average case, and worst case time complexity
		CO.CS(ECE)301.2	Solve different problem using stack, queue and linked list data structure.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

		CO.CS(ECE) 301.3	Apply Tree and Graph data structures and their traversal concept to solve different real time problems.
		CO.CS(ECE) 301.4	Analyze and compare different searching algorithm
		CO.CS(ECE) 301.5	Analyze and compare different sorting algorithm.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
3rd	SOLID STATE DEVICES (EC301)	CO.EC301.1	Analyze Schrödinger equation for crystals.
		CO.EC301.2	Classify direct and indirect band gap semiconductors and Fermi Dirac distribution
		CO.EC301.3	Solve problems related to semiconductor ion-concentration & Poisson's equations
		CO.EC301.4	Demonstrate different types of semiconductor devices and their response.
		CO.EC301.5	Describe mechanism of transistor operation and solving
3rd	CIRCUIT THEORY AND NETWORKS (EC302)	CO.EC302.1	Do the analysis of circuits using Kirchhoff's current and voltage laws (KCL and KVL), theorems, create current and voltage equations, and solve various cases of problems.
		CO.EC302.2	Identify, describe and analysis two port networks.
		CO.EC302.3	Realize and analysis the graph theory and networks.
		CO.EC302.4	Realize and describe the operation of circuit transients.
		CO.EC302.5	Identify and realize the application of Laplace transform in the circuits.
		CO.EC302.6	Realize and analysis the resonant circuits.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
3rd	Numerical Methods LAB (M(CS)391)	CO.M(CS)391.1	Analyze real world scenarios to recognize when different mathematical techniques are to be used for solving a problem.
		CO.M(CS)391.2	Modeling a system or situation (using technology, if appropriate) in order to solve the problems using multiple approaches.
		CO.M(CS)391.3	Judge if the results are reasonable, and then interpret and clearly communicate the results.
		CO.M(CS)391.4	Appreciate concepts of numerical methods, understand and be able to apply the concepts to solve different real-world problems like optimization, interpolation etc.
		CO.M(CS)391.5	Implement the techniques of numerical methods within the field of mathematics, science, engineering and management.
		CO.M(CS)391.6	Help build an understanding of how abstract foundations support and frequently evolve into concrete technologies.
3rd	CIRCUIT THEORY & NETWORK LAB (EC 392)	CO.EC392.1	Do the solution of series & parallel resonant circuit problems in real life.
		CO.EC392.2	Design solutions of complex engineering problems related to networks theorem for the public health, safety, cultural, societal, and environmental considerations.
		CO.EC392.3	Use knowledge and methods to provide valid conclusions of transient response ,the effect of inductance on speed of system response.
		CO.EC392.4	Create, select, and apply appropriate techniques, resources with the understanding of the limitations in two port networks.
		CO.EC392.5	Use knowledge and methods to generate various types of signals , representation of poles and zeros in s-plane and determination of partial fraction expansion in s-domain and cascade connection of second-order systems using MATLAB.
		CO.EC392.6	Realize and describe the operation of synchronous/asynchronous up/down counter.
3rd	DATA STRUCTURE LAB (CS(ECE) 391)	CO.CS(ECE) 391.1	Implement stack, queue and linked list data structure.Analyze the different algorithm and can find their best case, average case, and worst case time complexity
		CO.CS(ECE) 391.2	Solve different problem using stack, queue and linked list data structure.
		CO.CS(ECE) 391.3	Implement and Apply Tree and Graph data structures and their traversal concept to solve different real time problems.
		CO.CS(ECE) 391.4	Analyze and Implement different searching algorithm

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

		CO.CS(ECE) 391.5	Analyze and Implement different sorting algorithm.
--	--	---------------------	--

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
3rd	Technical Skill development (MC381)	CO.MCE381.1	Analyze and design different resistive network
		CO.MCE381.2	Design Bridge rectifier and analyze it's ripple factor and to design filters using R,L,C to minimize it.
		CO.MCE381.3	Design audio amplifier analyzing different regions of CE mode
		CO.MCE381.4	Explain and design different kinds of power supply
		CO.MCE381.5	Use diodes to design Or and AND gates

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
Sem. No. 4th	PHYSICS -II (PH(ECE) 401)	CO.PH(ECE)401.1	Apply the knowledge of Schrödinger equation in problems of junction diode, tunnel diode, Band theory explain electrical conductivity of metal, insulators and semiconductor, Magnetism and semiconductor physics in data storage, Organic Semiconductors and nanomaterials
		CO.PH(ECE)401.2	Analyze the need of suitable theoretical methods to explain electron transport in all types of material, Wide spread use of semiconductor devices, Physics of storage devices, Role of organic semiconductors over existing semiconductor devices
		CO.PH(ECE)401.3	Design and realize Physics of insulators and probable areas of application, Storage devices using magnetic material, semiconductor devices, Simple but small systems with novel physical properties
		CO.PH(ECE)401.4	Conduct experiments using Band theory and electron transport in a semiconductor, Intrinsic semiconductor under electric and magnetic field, Temperature sensor, thermoelectric sensor
		CO.PH(ECE)401.5	Communicate effectively, write reports and make effective presentation using available technology, on topics allied to the subject particularly in areas of applications shared in student seminar
		CO.PH(ECE)401.6	Engage in independent self-study to formulate, design, enhance, demonstrate New elements with novel physical properties, Correct model of electron transport in organic systems
	Signals and Systems (EC401)	CO.EC401.1	Classify various types of signals and systems
		CO.EC401.2	Analyze time domain signals both discrete and continuous
		CO.EC401.3	Analyze Fourier series for continuous-time periodic signals
		CO.EC401.4	Perform Fourier transform, z transforms of the signals
		CO.EC401.5	Apply the concept of sampling and sampling theorem for signal discretization
	Analog Electronic Circuits (EC 402)	CO.EC402.1	Analyze the basic form of Voltage Regulator and Power Supply Filters
		CO.EC402.2	Explain different operational parameters of CE, CC amplifiers
		CO.EC402.3	Design and describe the different parameters and functions of MOSFET amplifiers of CS, CD, CG mode
		CO.EC402.4	Analyze the basic and functional areas of Operational Amplifier
		CO.EC402.5	Design and Explain the circuitry of NE555 timer in astablemonostablebistable mode
4th	DIGITAL ELECTRONIC AND CIRCUITS (EC403)	CO.EC403.1	Realize and describe the operation of even parity generation and checking circuit
		CO.EC403.2	Identify and describe the six basic logic gates and combinational circuits in digital electronics.
		CO.EC403.3	Realize and describe the operation of MUX, decoders, adder, subtractor, BCD adder
		CO.EC403.4	Realize and describe the operation of 4-bit magnitude comparator circuit.
		CO.EC403.5	Identify and realize circuits using flip-flop.
		CO.EC403.6	Realize and describe the operation of synchronous/asynchronous up/down counter.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
4th	Analog Communication (EC 404)	CO.EC404.1	Demonstrate the need for modulation and the importance of Multiplexing and explain application areas.
		CO.EC404.2	Define and Classify Modulation, Classify, analyze and compare various types of Amplitude modulation and demodulation techniques
		CO.EC404.3	Describe and analyze the super heterodyne principle with block diagram
		CO.EC404.4	Classify, analyze and compare various types of Angle modulation and demodulation techniques
		CO.EC404.5	Demonstrate the need for Multiplexing and realize the same using modulation techniques
		CO.EC404.6	Explain various sources of channel noise, analyze SNR and Figure of Merit for different modulation systems
4th	PHYSICS-II Lab (PH(ECE)491)	CO.PH(ECE)491.1	Define, understand and explain instruments used in spectroscopy, Oscilloscope (digital), Solenoidal field, Magnetization, demagnetization
		CO.PH(ECE)491.2	Apply the knowledge of Hysteresis in magnetic storage, Photovoltaic action in solar cell, Band theory in operation of LED
		CO.PH(ECE)491.3	Analyze Role of magnetic field in changing resistance of a sample
		CO.PH(ECE)491.4	Conduct experiments using Intrinsic semiconductor, Temperature sensor, Photovoltaic cell, Light emitting diodes, Light dependent resistor, Various types of magnetic materials, Curie temperature of the given ferroelectric material
		CO.PH(ECE)491.5	Communicate effectively, write reports and make effective presentation using available technology, on presentation of laboratory experiment reports, on presentation of innovative experiments
		CO.PH(ECE)491.6	Engage in independent self-study to perform, Performing mini project with the lab

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
4th	ANALOG ELECTRONIC CIRCUITS LAB (EC492)	CO.EC492.1	Design circuits using semiconductor devices;
		CO.EC492.2	Determine the characteristics of analog electronic circuit devices such as BJTs and FETs.
		CO.EC492.3	Explain the operation of operational amplifiers and other amplifiers;
		CO.EC492.4	Conduct experiments using analog electronic components and electronic instruments of different functions
		CO.EC492.5	Design analog electronic circuits, power amplifiers, feedback amplifiers for given specifications.
		CO.EC492.6	Construct and Implement suitable circuits as a part of Small Projects
4th	Digital Electronics & Integrated Circuits Laboratory (EC 493)	CO.EC493.1	Realize and describe the operation of even parity generation and checking circuit
		CO.EC493.2	Identify and describe the six basic logic gates and combinational circuits in digital electronics.
		CO.EC493.3	Realize and describe the operation of MUX, decoders, adder, subtractor, BCD adder
		CO.EC493.4	Realize and describe the operation of 4 bit magnitude comparator circuit.
		CO.EC493.5	Identify and realize circuits using flip-flop.
		CO.EC493.6	Realize and describe the operation of synchronous/asynchronous up/down counter.
4th	Analog Communication Lab (EC 494)	CO.EC494.1	Demonstrate the need and concept of analog communication techniques and their applications.
		CO.EC494.2	Analyse the practical methods of communication signal generations.
		CO.EC494.3	Distinguish qualitatively various practical methods of demodulation of communication signals.
		CO.EC494.4	Justify the significance of modulation index in analog communication.
		CO.EC494.5	Develop insight into the relations between the input and output ac signals in various stages of a transmitter and a receiver of AM & FM systems..
		CO.EC494.6	Establish graphical relation of various output parameters with respect to input parameters

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
4th	Technical Report Writing and Language Practice Lab (TRLP) (HU 481)	CO.HU481.1	Learn to write project reports, technical reports etc.
		CO.HU481.2	Learn to build up team as well as improve efficiency.
		CO.HU481.3	Learn to improve their communication skills as well as personality.

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
5th	ENVIRONMENTAL SCIENCE (HU501)	CO.HU501.1	Describe the structure and function of environment and different types of environmental pollution.
		CO.HU501.2	Identify the types and use of different types of natural resources.
		CO.HU501.3	Demonstrate environmental problems like global warming, acid rain etc. from the given list.
		CO.HU501.4	Demonstrate the controlling method of environmental pollution.
		CO.HU501.5	Apply the method of synthesis of green chemistry.
		CO.HU501.6	Perform team work in a project.
5th	DIGITAL COMMUNICATION SYSTEMS (EC501)	CO.EC501.1	Apply the knowledge of probability and statistical calculations on random signal analysis
		CO.EC501.2	Analyze Signal Vector Representation of various digitally modulated signals by creating signal constellation
		CO.EC501.3	Derive the Analogy between signal and vector and distinguish orthogonality and orthonormality find basis function
		CO.EC501.4	Describe concepts of sampling, Pulse Modulation techniques and their comparison.
		CO.EC501.5	Demonstrate Inter Symbol Interference (ISI), Eye pattern, Nyquist criterion for zero ISI, equalizer, zero forcing equalizer, timing extraction

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

		CO.EC501.6	Illustrate various types of coherent and non-coherent Binary Modulation Techniques, calculate their error probabilities
5th	MICROPROCESSOR & MICROCONTROLLER (EC 502)	CO.EC502.1	Able to correlate the architecture, instructions, timing diagrams, addressing modes, memory interfacing, interrupts, data communication of 8085
		CO.EC502.2	Able to interpret the 8086 microprocessor-Architecture, Pin details, memory segmentation, addressing modes, basic instructions, interrupts
		CO.EC502.3	Recognize 8051 micro controller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o, interrupts
		CO.EC502.4	Apply instructions for assembly language programs of 8085, 8086 and 8051
		CO.EC502.5	Design peripheral interfacing model using IC 8255, 8253, 8251 with IC 8085, 8086 and 8051.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
5th	DIGITAL SIGNAL PROCESSING (EC 503)	CO.EC503.1	analyse discrete time systems in frequency domain and their region of convergence using Z Transforms.
		CO.EC503.2	define discrete systems in the Frequency domain using Fourier analysis tools like DFT, FFT.
		CO.EC503.3	interpret the properties of discrete time signals in frequency domain.
		CO.EC503.4	analyse discrete time signals and systems in frequency domain.
		CO.EC503.5	describe the digital signal processing, sampling and aliasing.
		CO.EC503.6	implement digital filters.
5th	POWER ELECTRONICS (EC 504A)	CO.EC504A.1	Demonstrate Applications of power electronics
		CO.EC504A.2	Explain principles and Characteristics of power devices such as SCR, diac, triac, GTO, PUJT, power transistors – power FETs – LASCR –
		CO.EC504A.3	Analyze Triggering techniques to turn on circuits for SCR, Thyristor turn off methods, Rectifiers with inductive loads, RL load.
		CO.EC504A.4	Apply knowledge of Voltage and current source inverters, resonant, Series inverter, PWM inverter, AC and DC choppers, DC to DC converters, Buck, boost and buck – boost in complex problem solving.
		CO.EC504A.5	Motivate in prototype implementation with the principles of AC Voltage Controllers, Cyclo-converters Industrial applications, DC Motor Speed control, Induction Motor Speed Control.
5th	ELECTRICAL & ELECTRONICS MEASUREMENT (EC 504B)	CO.EC504B.1	explain the characteristics, construction and working principle analog instruments like: PMMC, MI, Electrodynamometer type and Energy meter
		CO.EC504B.2	demonstrate the principle to measure resistance, capacitance, inductance with the help of Bridge balancing technique
		CO.EC504B.3	describe the construction and working principle of electronic instrument like: DSO, DMM, spectrum analyzer, distortion meter
		CO.EC504B.4	illustrate the functionality of sensor and transducer element
		CO.EC504B.5	demonstrate the principle of working of Telemetry System, Display device, Interface Standard, Data Acquisition system, Advanced Instruments Like OTDR, virtual instrument and PLC

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
5th	TELECOMMUNICATION ENGINEERING (EC504C)	CO.EC504C.1	Demonstrate fundamental concept of elements of telecommunication system.
		CO.EC504C.2	Define and distinguish electromechanical, electronic, digital and analog switching systems.
		CO.EC504C.3	analyze traffic engineering, transmission systems and telephone network.
		CO.EC504C.4	Select parameters in designing telephone switches
		CO.EC504C.5	Analyze Time Division Multiplexing Services, Broadband, IP telephony and Optical Network.
5th	DIGITAL COMMUNICATION SYSTEMS LAB (EC591)	CO.EC591.1	Analyze the concept of digital communication techniques and their applications.
		CO.EC591.2	Demonstrate to the practical methods of the use of generating communication signals.
		CO.EC591.3	Evaluate practical methods of the use of demodulation communication signals.
		CO.EC591.4	Distinguish the significance of signal constellation and spectral width.
		CO.EC591.5	Develop insight into the relations between the input and output signals in various stages of a transmitter and a receiver.
		CO.EC591.6	Clearly distinguish between contemporary digital communication techniques.
5th	Microprocessor and Microcontroller LAB (EC592)	CO.EC592.1	Able to solve small assignments using the 8085 basic instruction sets and memory mapping through trainer kit and simulator.
		CO.EC592.2	Able to write 8085 assembly language programs like Addition, Subtraction, Multiplication, Square, Complement,
		CO.EC592.3	Create look up table, copying a block of memory, Shifting, Packing and unpacking of BCD numbers, Ascending order, Descending order etc. using trainer kit.
		CO.EC592.4	Able to validate the interfacing technique using 8255 trainer kit through subroutine calls and IN/OUT instructions like glowing LEDs accordingly, stepper motor rotation etc.
		CO.EC592.5	Able to test fundamental of 8051 programs using the trainer kit.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
5th	Digital Signal Processing LAB (EC594)	CO.EC594.1	carry out simulation of DSP systems
		CO.EC594.2	analyze z-transform, DTFT, DFT and DWT to analyze and design DSP systems
		CO.EC594.3	Analyze the applications of FFT to DSP
		CO.EC594.4	analyze Finite word length effect on DSP systems
		CO.EC594.5	Design adaptive filters for various applications of DSP.
5th	Mini Project-I (EC581)	CO.EC581.1	Apply the knowledge acquired through survey of recent research to set the project goal.
		CO.EC581.2	Distinguish the way of implementation of prototype
		CO.EC581.3	Identify the fault issue through various case study
		CO.EC581.4	Implement the prototype using modern tools
		CO.EC581.5	Demonstrate the project design to share the idea through conference/workshop/seminar etc.
		CO.EC581.6	Modify the project design for the benefit to societal issues

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
6th	EM WAVE PROPAGATION & ANTENNA (EC 601)	CO.EC 601.1	Demonstrate the concept of Vector calculus.
		CO.EC 601.2	Analyze Electrostatic and Magneto static fields.
		CO.EC 601.3	Interpret the Electromagnetics Field and Maxwell Equation.
		CO.EC 601.4	Analyze Wave propagation in isotopic medium.
		CO.EC 601.5	Interpret Circuit Theory as an approximation to Field Theory
		CO.EC 601.6	Explain the mathematical model of Transmission Line Theory.
6th	INFORMATION THEORY & CODING (EC 602)	CO.EC602.1	Distinguish information as measurable quantity.
		CO.EC602.2	Distinguish quantitative theory of information and its applications to reliable, efficient communication systems.
		CO.EC602.3	analyze the methods of probabilistic source coding and error correction techniques are ingrained quantitatively.
		CO.EC602.4	analyze to the idea of galois field.
		CO.EC602.5	Distinguish to methods of secure trasmission techniques.
		CO.EC602.6	Perform various source & channel coding and decoding techniques.
6th	CONTROL SYSTEM (EC 603)	CO.EC 603.1	Design control system modelling techniques and demonstrate its applications.
		CO.EC 603.2	Elaborate the concepts related to the time domain response of a system operation analysis.
		CO.EC 603.3	Explain the concepts related to the time response of a system stability analysis.
		CO.EC 603.4	Describe the concepts related to the Frequency domain response of a system operation analysis.
		CO.EC 603.5	Demonstrate the recompense technique that can be used to stabilize control systems.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
6th	OBJECT ORIENTED PROGRAMMING (EC 604A)	CO.EC604A.1	Demonstrate the key concepts of object oriented programming
		CO.EC604A.2	Design object oriented programs and appreciate the techniques of good design;
		CO.EC604A.3	Explain advanced features of Java .
		CO.EC604A.4	Analyze complex programming problems and optimize the solutions.
		CO.EC604A.5	Apply programming code of ethical principles to problems related to the Information Technology Industry.
6th	ADVANCED MICROCONTROLLER & EMBEDDED SYSTEM (EC 604B)	CO.EC604B.1	Describe history and evolution of AVR family microcontroller.
		CO.EC604B.2	Describe RISC architecture and different components in AVR architecture.
		CO.EC604B.3	Write the instructions for the AVR series microcontroller
		CO.EC604B.4	Explain different communication links for the AVR microcontroller.
		CO.EC604B.5	Describe and implement hardware interfacing.
6th	OPTICAL FIBRE COMMUNICATION (EC 604C)	CO.EC604C.1	Demonstrate the evolution of optical networks and its various components and applicability in modern world of communication
		CO.EC604C.2	Analyze link budgets and choose from different options to meet the budget.
		CO.EC604C.3	Apply the knowledge in Light Emitting Diode, principle, structures, power and efficiency, coupling to fibres and Laser diodes principle, double heterostructure, gain and index guiding, distributed lasers
		CO.EC604C.4	Demonstrate Quantum Well Lasers Modes and narrow line width lasers.
		CO.EC604C.5	Explain Modulation, Bandwidth for modulation, Optical transmitters with components

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
6th	ENGINEERING SYSTEM DESIGN & ANALYSIS (EC 605A)	CO.EC605A.1	Explain the principles and tools of systems analysis
		CO.EC605A.2	Demonstrate the professional & ethical responsibilities of practicing the computer professional including understanding the need for quality.
		CO.EC605A.3	Solve a wide range of problems related to the analysis, design and construction of information systems & analysis and design of systems of small sizes.
		CO.EC605A.4	Plan and undertake a major individual project
		CO.EC605A.5	Prepare and deliver coherent and structured verbal and written technical reports
6th	MATERIAL SCIENCE & ENGINEERING (EC 605B)	CO.EC605B.1	Explain the conducting, semiconducting, superconducting, dielectric, ferro-electric and piezoelectric behavior of materials
		CO.EC605B.2	Differentiate between diamagnetic, paramagnetic, ferromagnetic, ferro-magnetic, and anti-ferromagnetic behavior of materials
		CO.EC605B.3	Synthesize and process semi-conducting materials for engineering applications
		CO.EC605B.4	Demonstrate the effect of composition, structure and temperature on the properties of the materials.
		CO.EC605B.5	Describe the interactions of light with materials and its effects at the interface
		CO.EC605B.6	Elaborate the working principles of different Electronic Materials, Nanomaterials, solid state devices,
6th	COMPUTER COMMUNICATION & NETWORKS (EC 605C)	CO.EC605C.1	Explain various protocols used in data communication
		CO.EC605C.2	Design networking structure in data communication.
		CO.EC605C.3	Explain how data is to be transmitted from one place to another.
		CO.EC605C.4	Analyze security of data transmission through networking
		CO.EC605C.5	Analyze performance of network devices

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
6th	EM WAVE PROPAGATION & ANTENNA LAB (EC 691)	CO.EC691.1	Measure the transmission line parameters.
		CO.EC691.2	Determine unknown impedance on Smith Chart using Impedance Measurement.
		CO.EC691.3	Realized the impedance matching network
		CO.EC691.4	Detect the frequency spectrum of a signal using Spectrum Analyzer
		CO.EC691.5	Measure the radiation pattern measurement of different antennas.
		CO.EC691.6	Determine the Gain of a antenna using antenna measurement.
6th	CONTROL SYSTEM ENGINEERING LAB (EC 693)	CO.EC693.1	Analyze several preliminary command for MATLAB Control System tool Box, MATLAB- SIMULINK tool box. Transfer function Generation approach for Modelling the LTI system.
		CO.EC693.2	Determine the step response for 1st order & 2nd order system with unity feedback & calculation of control system specifications for variations of system design.
		CO.EC693.3	Simulate and analyze different test response for Type-I & Type-II system with unity feedback using MATLAB.
		CO.EC693.4	Demonstrate BIBO system with step response analysis by pole shifting.
		CO.EC693.5	Analyze Step response for some standard transfer function with Simulink & Control Block set Calling
		CO.EC693.6	Design root locus, Bode-plot, Nyquist Plot, using MATLAB control system toolbox for a given 2nd order transfer function & determine different control system specifications.
6th	OBJECT ORIENTED PROGRAMMING LAB (EC 694A)	CO.EC694A.1	Apply object-oriented programming concepts in designing programs
		CO.EC694A.2	Analyze different dimensions of a problem and provide optimal solutions.
		CO.EC694A.3	Designing projects with the advance features of JAVA
		CO.EC694A.4	Analyze complex programming problems and optimize the solutions.
		CO.EC694A.5	Apply programming code of ethical principles to problems related to the Information Technology Industry.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
6th	ADVANCED MICROCONTROLLER & EMBEDDED SYSTEM LAB (EC 694B)	CO.EC694B.1	Explain different communication links for the AVR microcontroller.
		CO.EC694B.2	Describe history and evolution of AVR family microcontroller.
		CO.EC694B.3	Describe RISC architecture and different components in AVR architecture.
		CO.EC694B.4	Write the instructions for the AVR series microcontroller
		CO.EC694B.5	Describe and implement hardware interfacing.
6th	OPTICAL FIBRE COMMUNICATION LAB (EC 694C)	CO.EC694C.1	Explain Basic knowledge about the input output characteristics
		CO.EC694C.2	Able to define and analyse the attenuation constant, bending loss
		CO.EC694C.3	Able to define, analyze and draw V-I characteristics of optical fibre
		CO.EC694C.4	Able to define, analyze and draw P-I characteristics of optical fibre
		CO.EC694C.5	Apply the knowledge in Light Emitting Diode, principle, structures, power and efficiency, coupling to fibres and Laser diodes principle, double heterostructure, gain and index guiding, distributed lasers
6th	Mini Project-I (EC681)	CO.EC681.1	Apply the knowledge acquired through survey of recent research to set the project goal.
		CO.EC681.2	Distinguish the way of implementation of prototype
		CO.EC681.3	Identify the fault issue through various case study
		CO.EC681.4	Implement the prototype using modern tools
		CO.EC681.5	Demonstrate the project design to share the idea through conference/workshop/seminar etc.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
7th	VALUES AND ETHICS IN PROFESSION (HU 701)	CO.HU701.1	Explain the core values that shape the ethical behavior of an engineer
		CO.HU701.2	Build up awareness on professional ethics and human values.
		CO.HU701.3	Demonstrate the basic perception of profession, professional ethics, various moral issues & uses of ethical theories
		CO.HU701.4	Develop various social issues, industrial standards, code of ethics and role of professional ethics in engineering field
		CO.HU701.5	Assign responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer
7th	RF & MICROWAVE ENGINEERING (EC 701)	CO.EC701.1	Explain the Microwave Frequency range and their application.
		CO.EC701.2	Develop fundamental understanding of the Two –port RF network and matching techniques.
		CO.EC701.3	Analyze the Scattering matrix for microwave passive components.
		CO.EC701.4	Demonstrate the Microwave tubes and devices along with their fundamental principle of operation.
		CO.EC701.5	Apply the microwave measurements techniques for project development
7th	VLSI & MICROELECTRONICS (EC 702)	CO.EC702.1	Able to describe scale of integration – SSI, MSI, LSI, VLSI, Moor's Law, scaling, short channel effect, VLSI design flow, FPGA architecture and construct gate level circuit with PAL & PLA concept.
		CO.EC702.2	Able to analyze CMOS inverter voltage transfer characteristics with the parameters – V_{IL} , V_{IH} , V_{OL} , V_{OH} , V_{th} and based on the knowledge of digital circuit design methodology like – CMOS, Pass transistor, TG, DCVSL, dynamic logic, NORA, able to construct schematic of combinational, sequential circuit, SRAM, DRAM cell using MOSFET

		CO.EC702.3	Based on the fundamental concept of MOSFET characteristics and model, able to calculate value of resistance of current source, MOS diode, current of current mirror circuit , voltage of references (voltage divider , threshold voltage and band gap), emulate resistance of switch capacitor circuit , gain of switch capacitor integrator and 1 st order switch capacitor filter .
		CO.EC702.4	With the help of MOS transistor model, able to calculate the value of parameters to design CMOS differential amplifier and two stage OP-AMP.
		CO.EC702.5	Able to describe fabrication steps of IC and construct stick diagram & layout of CMOS inverter and basic gates based on lambda and micron design rules.
		CO.EC702.6	Able to calculate gate delay, dynamic power, short circuit power and leakage power and total power consumption across CMOS inverter circuit based on the derived expression of delay and power.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
7th	DIGITAL IMAGE PROCESSING (EC 703A)	CO.EC703A.1	Have a clear idea on Digital Imaging fundamentals and Importance of Digital Image Transform.
		CO.EC703A.2	Understanding the importance of Digital Image enhancement in spatial and frequency domain and filtering techniques
		CO.EC703A.3	Explaining the requirements and types of Image Compression and its standards.
		CO.EC703A.4	Demonstrate the basic concepts of Digital Image Restoration and Segmentation of Digital Images
		CO.EC703A.5	Familiarize with Edge detection techniques and concepts on security in Digital Image Processing
7th	COMPUTER ORGANIZATION & ARCHITECTURE (EC 703B)	CO.EC703B.1	The students will be able to know about basic of computer architecture, existing architectures and design related computing systems.
		CO.EC703B.2	The students will be able to design about basic of computer memory structures and RAM, ROM architecture.
		CO.EC703B.3	The students will be able to know about different CPU architecture & Processor-memory communication technique.
		CO.EC703B.4	The students will be able to know about pipelining techniques and design related architectures.
		CO.EC703B.5	The students will be able to know about ILP, Superscalar, VLIW architectures.
		CO.EC703B.6	The students will be able to know the basic concepts of VHDL.
7th	DATA BASE MANAGEMENT SYSTEMS (EC 703C)	CO.EC703C.1	Apply the knowledge of Entity Relationship (E-R) diagram for an application.
		CO.EC703C.2	Create a normalized relational database model
		CO.EC703C.3	Analyze real world queries to generate reports from it.
		CO.EC703C.4	Determine whether the transactions satisfy the ACID properties.
		CO.EC703C.5	Create and maintain the database of an organization.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
7th	ARTIFICIAL INTELLIGENCE & ROBOTICS (EC 704A)	CO.EC704A.1	Explain Artificial Intelligence & Robotics, Turing Test, Intelligent Agents, classification and usage of robots
		CO.EC704A.2	Classify different type of RADAR
		CO.EC704A.3	Analyze Radar signals & clutter
		CO.EC704A.4	Explain the working principle of RADAR transmitter and receiver system.
		CO.EC704A.5	Interpret Jammers, Stealth and counter-stealth technology.
		CO.EC704A.6	Utilize RADAR in practical application
7th	BIOMEDICAL ELECTRONICS & IMAGING (EC 704B)	CO.EC704B.1	Explain Bioelectric signals ,human physiological system and different types of transducers.
		CO.EC704B.2	Understand different types of medical measurement system.
		CO.EC704B.3	Able to understand deferent types of biomedical signal acquisition electrodes and different types of signal amplification techniques and able to design the amplifiers .
		CO.EC704B.4	Able to examine the data handling, filtering techniques of bio-medical signals and able to analysis of time and frequency domain.
		CO.EC704B.5	Able to understand medical imaging techniques and implement different algorithms to feature extract the signals.
7th	RENEWABLE SOURCE & APPLICATIONS (EC 704C)	CO.EC704C.1	Explain the importance of Renewable energy over conventional process and learn different methods of Power generation from the Non- conventional sources
		CO.EC704C.2	Analyze the different techniques of grid integration of the power generated from renewable energy sources with the initiation of power electronic converters and drives.
		CO.EC704C.3	Design different hybrid energy systems and energy storage systems
		CO.EC704C.4	Build up activity using Solar, Wind Energy, Biomass, Geothermal energy, OTEC, Tidal energy ,MHD Power generation schemes.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
7th	RF & MICROWAVE ENGINEERING LAB (EC 791)	CO.EC791.1	Develop fundamental understanding of the Two –port RF network and matching techniques.
		CO.EC791.2	Analyze the Scattering matrix for microwave passive components.
		CO.EC791.3	Demonstrate the Microwave tubes and devices along with their fundamental principle of operation.
		CO.EC791.4	Apply the microwave measurements techniques for project development
		CO.EC791.5	Describe the design aspects.
7th	VLSI & MICROELECTRONICS LAB (EC 792)	CO.EC792.1	Able to simulate VTC of CMOS inverter measure V_{IL} , V_{IH} , V_{OL} , V_{OH} and calculate noise margin
		CO.EC792.2	Able to measure and analyze gate delay and average power consumption of CMOS inverter for $V_{DD} \leq 1.2$ V and with the nano dimensional channel length of MOS transistor through transient analysis
		CO.EC792.3	Able to design combinational circuit - CMOS AND/NAND, OR/NOR, XOR/XNOR gate, CMOS full adder circuit, sequential circuit -CMOS SR latch, clocked SR latch & D flip-flop at schematic level for functional verification with the help of SPICE tools
		CO.EC792.4	Able to construct layout of CMOS inverter, CMOS NAND, CMOS NOR gate using layout design tools of SPICE based on design rules
		CO.EC792.5	Design of combinational circuits - logic gates, Full adder using half adder, 4:1 MUX using 2:1 MUX , Sequential circuits-S-R Flip-Flop , 8 bit synchronous counter , 8 Bit bi-directional register with tri-stated input output using VHDL and 4:1 MUX using FPGA
		CO.EC792.6	Design of CMOS differential amplifier with active load and biased with current mirror for given specification using SPICE tools at schematic level.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

7th	DIGITAL IMAGE PROCESSING (EC 793A)	CO.EC793A.1	Build knowledge on Digital Imaging fundamentals and Digital Image Transform.
		CO.EC793A.2	Understanding Digital Image enhancement techniques in spatial and frequency domain
		CO.EC793A.3	Explaining the requirements and types of Image Compression and its standards.
		CO.EC793A.4	Demonstrate the Digital Image Restoration and Segmentation of Digital Images
		CO.EC793A.5	Build ideas on Edge detection techniques and concepts on Digital Image security

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
7 th	COMPUTER ORGANIZATION & ARCHITECTURE LAB (EC 793B)	CO.EC793B.1	The students will be able to design different digital circuits using HDL.
		CO.EC793B.2	The students will be able to design different sub-systems of the computer using HDL.
		CO.EC793B.3	The students will be able to design simple as well as complex CPU architecture.
7 th	DATA BASE MANAGEMENT SYSTEMS LAB (EC 793C)	CO.EC793C.1	Explain the basic concepts regarding database, know about query processing and techniques involved in query optimization and understand the concepts of database transaction and related database facilities including concurrency control, backup and recovery.
		CO.EC793C.2	Understand the introductory concepts of some advanced topics in data management like distributed databases, data warehousing, deductive databases and be aware of some advanced databases like partial multimedia and mobile databases.
		CO.EC793C.3	Differentiate between DBMS and advanced DBMS and use of advanced database concepts and become proficient in creating database queries.
		CO.EC793C.4	Analyze database system concepts and apply normalization to the database.
		CO.EC793C.5	Apply and create different transaction processing and concurrency control applications.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
7 th	PROJECT I (EC 781)	CO.EC781.1	Realize and identify the practical technical problems related to daily life.
		CO.EC781.2	Describe the model of the practical technical problems and solution of it.
		CO.EC781.3	Carry to team work by cooperating team members
		CO.EC781.4	Apply the theoretical knowledge into practical world.
		CO.EC781.5	Realize the difference between practical knowledge and theoretical knowledge.
		CO.EC781.6	Realize about the skill of management, leadership and team work.
7 th	TECHNICAL SEMINAR PRESENTATION (MC 782)	CO.EC782.1	Apply effective communication skills and exhibit leadership/participation in team work
		CO.EC782.2	Fulfills professional, social and ethical responsibilities
		CO.EC782.3	Plan, develop and implement strategies for life-long learning
		CO.EC782.4	Achieve good perception of the impact of solutions provided for developmental issues in a global/societal context
		CO.EC782.5	Capacity to function in multi/inter-disciplinary teams with a spirit of tolerance, patience and understanding so necessary for team work

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
8th	INDUSTRIAL AND FINANCIAL MANAGEMENT (HU 801)	CO.HU801.1	Students will be able to understand the basics of Accounting-Journal, Ledger & Balance Sheet.
		CO.HU801.2	Students will be able to understand capital budgeting.
		CO.HU801.3	Students will be able to state budget and budget control
		CO.HU801.4	Students will be able to learn about the working capital management.
8th	ADVANCED COMMUNICATION SYSTEMS (EC 801)	CO.EC801.1	analyze the methods of probabilistic source coding and error correction techniques are ingrained quantitatively.
		CO.EC801.2	analyze to the idea of galois field.
		CO.EC801.3	Distinguish to methods of secure transmission techniques.
		CO.EC801.4	Analyze link budgets and choose from different options to meet the budget.
		CO.EC801.5	Apply the knowledge in Light Emitting Diode, principle, structures, power and efficiency,
		CO.EC801.6	Demonstrate Quantum Well Lasers Modes and narrow line width lasers.
8th	PROJECT-II (EC881)	CO.EC881.1	Realize and identify the practical technical problems related to daily life.
		CO.EC881.2	Describe the model of the practical technical problems and solution of it.
		CO.EC881.3	Carry to team work by cooperating team members
		CO.EC881.4	Apply the theoretical knowledge into practical world.
		CO.EC881.5	Realize the difference between practical knowledge and theoretical knowledge.
		CO.EC881.6	Realize about the skill of management, leadership and team work.
8th	GRAND VIVA (EC882)	CO.EC882.1	Analyze and interpret scientific, technical and economic data collected
		CO.EC882.2	Identify, formulate and solve problems using simulation or otherwise
		CO.EC882.3	Use of techniques/tools including software
		CO.EC882.4	Achieve good perception of the impact of solutions provided for developmental issues in a global/societal context
		CO.EC882.5	Understand and accept professional, social, moral and ethical responsibilities and good knowledge of contemporary issues

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
8th	ADVANCED SEMICONDUCTOR DEVICES (EC 802A)	CO.EC802A.1	To understand all the aspects of operation and design for modern semiconductor devices, highlighting traditional, nanoscale and excitonic/organic device physics
		CO.EC802A.2	To analyze the semiconductor physics and the development of devices
		CO.EC802A.3	To expand their understanding of fundamental principles of modern electronic devices, while gaining exposure to cutting edge technology.
		CO.EC802A.4	To gain updated knowledge in the most advanced development of low dimensional semiconductor heterostructures and their applications.
		CO.EC802A.5	Describe and implement virtual hardware components
		CO.EC802A.6	accommodate novel materials: organic semiconductors, graphene and layered materials, and quantum dots..
8th	EMI / EMC (EC 802B)	CO.EC802B.1	Explain EMC problems
		CO.EC802B.2	Awareness of International EMC Standards for equipment design.
		CO.EC802B.3	Analyze Conducted EMI Coupling and Designing electronic systems for EMC
		CO.EC802B.4	Analyze Radiated EMI Coupling and Design for EMC
8th	MOBILE COMMUNICATION AND NETWORK (EC 802C))	CO.EC802C.1	Describe the evolution and History of Wireless Technology.
		CO.EC802C.2	Explain cellular concept for mobile communication.
		CO.EC802C.3	Learn radio signal propagation issues and different technological advancement of mobile communication.
		CO.EC802C.4	Define Wireless and Radio channels.
		CO.EC802C.5	Compare 3G Cellular telephone data transfer rates with those over Wireless LAN and core networks associated with 3G Cellular networks.
		CO.EC802C.6	Describe mobile IP allocation and function of the station roaming.

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

Sem. No.	Course Title (Code)	CO Codes	Course Outcomes
			On completion of the course students will be able to
8th	SOFTWARE ENGINEERING (EC 804A)	CO.EC804A.1	Understand the structure and behavior a software system the UML class diagrams and state diagrams.
		CO.EC804A.2	Understand common lifecycle processes including waterfall (linear), incremental approaches (such as Unified process), and agile approaches.
		CO.EC804A.3	Apply software testing and quality assurance techniques at the module level, and understand these techniques at the system and organization level.
		CO.EC804A.4	Work collaboratively in a small team environment to develop a moderate-sized software system from conceptualization to completion, including requirements elicitation, system modeling, system design, implementation, unit and system testing, integration, source code management configuration management, and release management
		CO.EC804A.5	Prepare technical documentations and make presentations on various aspects of a software development project, including the technical aspects (architecture, design, quality assurance) as well as the managerial aspects (planning, scheduling, and delivery).
		CO.EC804A.6	Design a solution to a given problem using one or more design patterns and implement the design in a programming language.
8th	PHYSICAL DESIGN, VERIFICATION & TESTING (EC 804B)	CO.EC804B.1	Able to Design, Verification and Test a VLSI circuit pertaining to these three phases.
		CO.EC804B.2	Aims to cover the important problems/algorithms/tools so that students get a comprehensive idea of the whole digital VLSI design flow.
		CO.EC804B.3	Able to understand High level Synthesis, Verilog RTL Design, Combinational and Sequential Synthesis Logic Synthesis (for large circuits) through VLSI Design.
		CO.EC804B.4	Able to analyze Hardware Verification and methodologies, Binary Decision Diagrams (BDDs) and algorithms over BDDs through Verification Techniques.
		CO.EC804B.5	Able to check Combinational equivalence checking, Temporal Logics, Modelling sequential systems and model checking, Symbolic model checking through Verification Techniques.
		CO.EC804B.6	Able to locate Fault models, Fault Simulation, Test generation for combinational circuits, Test generation algorithms for sequential circuits and Built in Self test through VLSI Testing.
		CO.EC804C.1	Explain Error Correction learning, Hebbian learning, Competitive

CO Statements for the academic year 2018-19, Electronics & Communication Engineering, JIS College of Engineering, Kalyani

8th	SOFT COMPUTING (EC 804C)	CO.EC804C.2	Demonstrate learning networks, gradient descent learning, Regression,
		CO.EC804C.3	Differentiate Active and Passive machine learning
		CO.EC804C.4	Elaborate Neural Network models: McCulloch-Pitts model, Feed forward & Feedback network, Perceptron, Adaline and Madeline networks;
		CO.EC804C.5	Differentiate single layer network, multi-layer networks, Back-propagation Network, Radial Basis function networks
		CO.EC804C.6	Apply Logical AND, OR. XOR problem, solving XOR Applications of Neural Networks: Pattern Recognition
8th	ADVANCED COMMUNICATION LAB (EC 891)	CO.EC891.1	Analyze the concept of Mobile, wireless and satellite communication techniques and their applications.
		CO.EC891.2	Demonstrate practically the use of satellite communication, link setup and the frequencies used.
		CO.EC891.3	Evaluate practically the modulation and demodulation techniques applied in communication signals.
		CO.EC891.4	Analyze the performance of a communication system under the effect of noise and fading.
		CO.EC891.5	Evaluate the various routing algorithms applied in the ad hoc networks

DEPARTMENT OF ELECTRICAL ENGINEERING

JIS COLLEGE OF ENGINEERING

Program Outcomes (POs)

PO 1. Ability to apply knowledge of science, mathematics, and engineering principles to solve electrical engineering problems.

PO 2. Ability to define, identify, formulate and solve Electrical Engineering problems in the broad areas like electrical machines, measurement, power electronics, power systems and control systems.

PO 3. Ability to design solutions for system/sub-system that meet desire specification for electrical engineering.

PO 4. Ability to conduct experimental investigation, analyze, evaluate and interpret results in the field electrical circuit & measurement, electrical machines, power systems, control systems, power electronics & drives and microprocessor & microcontroller etc.

PO 5. Ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.

PO 6. Ability to understand the impact of electrical engineering solutions in a global, economic, environmental, and societal context.

PO 7. Ability to understand the sustainability of Electrical Engineering solutions and its impact on health, safety, cultural issues, environment and society.

PO 8. Ability to an understanding of professional and ethical responsibility.

PO 9. Ability to function as an individual and as member in multidisciplinary teams.

PO 10. Ability to communicate effectively, write reports and make effective representation using available technique.

PO 11. Ability to apply the knowledge and understanding of project management, Engineering resource management and cost analysis while implementing projects.

PO 12. Ability to recognize the need for, and the concepts of learning to learn, and engage in lifelong learning.

Program Specific Outcomes (PSOs):

PSO 1. Apply the knowledge of Mathematics, Science and Electrical Engineering fundamentals to solve complex problems in electrical circuit & Networks, electrical machines, control systems, power systems and power electronics & drives.

PSO 2. Able to function effectively in allied fields such as software, electronics, communication and instrumentation by applying the knowledge of data structure & algorithm, microprocessor & microcontroller, computer programming, analog & digital electronics, digital signal processing and measurement & instrumentation.

PSO 3. To be able to work efficiently as a member or leader in multidisciplinary engineering projects by using management principles and professional ethics.

Course details of Electrical Engineering Department (UG, 2016 Regulation) with COs

Paper Name: Mathematics –I

Paper Code: M101

Course outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

M 101.1: Recall the distinctive characteristics of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis.

M 101.2: Understand the theoretical concept of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis.

M 101.3: Apply the principles of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis to solve various problems.

Paper Name: Chemistry

Paper Code: CH 101

Course Outcome

CH101.1: Able to apply fundamental concepts of thermodynamics in different engineering applications.

CH101.2: Able to analyze & design simple and technologically advanced electrical and energy storage devices.

CH101.3: Able to synthesize nanomaterials, composites, polymers.

CH101.4: Able to apply the basic concept of Organic Chemistry and knowledge of chemical reactions to industries, and technical fields.

CH101.5: Able to apply the knowledge of different fuels and corrosion to different industries

CH101.6: Able to analyse water quality parameter for its various parameters & its significance in industries.

Paper Name: Physics -I

Paper Code: PH 201

Course Outcome:

At the end of the course students' should have the

PH 101.1 : Ability to state and recall De-Broglie hypothesis, and Heisenberg's Uncertainty Principle Amplitude and Velocity Resonance Malus's Law, Brewster's Law Characteristics of LASER light

PH 101.2 : Ability to understand and explain Polarizer and analyzer basic principles and different types of LASER and Optical Fibre structure of solids, Miller indices theory of Matter Wave, equation of motion of Matter Wave wave function and its role in representing wave nature of matter

PH 101. 3 : Ability to apply the knowledge of mechanical vibration in electrical circuits superposition principle in Newton's ring phenomenon, diffraction phenomenon quantum nature of e.m. waves for production of laser total internal reflection in transmitting light through optical fibres x-ray diffraction in crystal structure probability interpretation in Heisenberg's uncertainty principle

PH 101.4 : Ability to analyze grating as many slit system role of Q factor in a resonating circuit, conditions of different types of resonance minimum requirements for lasing action importance of light as a carrier of information

Paper Name: Basic Electrical Engineering

Paper Code: EE101

Course Outcomes:

At the end of this course, students will able

EE 101.1: To understand and analyse basic electric and magnetic circuits.

EE 101.2: To understand and analysis the AC single phase and three phase circuit

EE101.3: To understand and analysis of the basic principles of various electrical machines

Paper Name: Basic Electronics Engineering

Paper code: EC201

Course Outcomes:

EC 101.1 Study PN junction diode, ideal diode, diode models and its circuit analysis, application of diodes and special diodes.

EC 101.2 Learn how operational amplifiers are modeled and analyzed, and to design Op- Amp circuits to perform operations such as integration, differentiation on electronic signals.

EC 101.3 Study the concepts of both positive and negative feedback in electronic circuits.

EC 101.4 Develop the capability to analyze and design simple circuits containing nonlinear elements such as transistors using the concepts of load lines, operating points and incremental analysis.

EC 101.5 Learn how the primitives of Boolean algebra are used to describe the processing of binary signals.

Paper Name: Communicative English

Paper Code: HU101

Course Outcomes:

At the end of this course, students will be

HU101.1: Able to comprehend and communicate in English through exposure to communication skills theory and practice.

HU101.2: Apply the basic grammatical skills of the English language through intensive practice.

HU101.3: Able to develop reading and comprehension skills.

HU101.4: Able to develop writing proficiency skills by writing Official Letters, Technical report, memo, notice, minutes, agenda, resume, curriculum vitae.

HU101.5: Able to apply/illustrate all sets of English language and communication skills in creative and effective ways in the professional sphere of their life

Paper Name: Engineering Mechanics

Paper Code: ME101

Course Outcome:

Upon successful completion of the course, student should be able to:

ME 101.1. Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.

ME 101.2. Study the effect of friction in static and dynamic conditions.

ME 101.3. Understand the different surface properties, property of masses and material properties.

ME 101.4. Analyze and solve different problems of kinematics and kinetics.

Paper Name: Lang. Lab. and Seminar Presentation

Paper Code: HU191

Course Outcome:

HU191.1: Able to understand advanced skills of Technical Communication in English through Language Laboratory.

HU191.2: Able to apply listening, speaking, reading and writing skills in societal and professional life.

HU191.3: Able to demonstrate the skills necessary to be a competent Interpersonal communicator.

HU191.4: Able to analyze communication behaviors.

HU191.5: Able to adapt to multifarious socio-economical and professional arenas with the help of effective communication and interpersonal skills.

Paper Name: Chemistry Lab

Paper Code: CH 191

Course Outcome

CH191.1: Able to operate different types of instruments for estimation of small quantities chemicals used in industries and scientific and technical fields.

CH191.2: Able to work as an individual also as a team member

CH191.3: Able to analyse different parameters of water considering environmental issues

CH191.4: Able to synthesize nano and polymer materials.

CH191.5: Capable to design innovative experiments applying the fundamentals of chemistry

Paper Name: Physics I Lab

Paper Code: PH 291

Course Outcome

At the end of the course students' should have the

PH 191.1 : Ability to define, understand and explain Error estimation, Proportional error calculation. superposition principle in Newton's ring, Fresnel's biprism, laser diffraction Basic circuit analysis in LCR circuits.

PH 191.2 : Ability to conduct experiments using LASER, Optical fibre Interference by division of wave front, division of amplitude, diffraction grating, polarization of light Quantization of electronic energy inside an atom Torsion pendulum.

PH 191.3 : Ability to participate as an individual, and as a member or leader in groups.

Paper Name: Basic Electrical Engineering LAB

Paper Code: EE191

Course Outcome:

- EE191.1 Identify common electrical components and their ratings.
- EE191.2 Make Circuit connection by wires of appropriate ratings.
- EE191.3 Understand the usage of common electrical measuring instruments
- EE191.4 Understand the basic characteristics of transformers and electrical machines

Paper Name: Basic Electronics Engineering Lab

Paper Code: EC291

Course Outcomes:

- EC191.1 Knowledge of Electronic components such as Resistors, Capacitors, Diodes, Transistors measuring equipment like DC power supply, Multimeter, CRO, Signal generator, DC power supply.
- EC191.2 Analyze the characteristics of Junction Diode, Zener Diode, BJT & FET and different types of Rectifier Circuits.
- EC191.3 Determination of input-offset voltage, input bias current and Slew rate, Common- mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
- EC191.4 Able to know the application of Diode, BJT & OPAMP.
- EC191.5 Familiarization and basic knowledge of Integrated Circuits

Paper Name: Engineering Drawing & Graphics

Paper Code: ME 191

Course Outcomes:

Upon successful completion of this course, the student will be able to:

- ME 191.1. Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.
- ME 191.2. Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.
- ME 191.3. Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.
- ME 191.4. Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

Paper Name: Workshop Practice

Paper Code: ME192

Course Outcome:

Upon successful completion of this course, the student will be able to:

- ME192.1 Gain basic knowledge of Workshop Practice and Safety useful for our daily living.
- ME192.2 Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and performing operations like such as Marking, Cutting etc used in manufacturing processes.
- ME192.3 Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing
- ME192. 4 Get hands on practice of in Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

Paper Name: Mathematics-II

Paper Code: M 201

Course outcome

On successful completion of the learning sessions of the course, the learner will be able to:

M 201.1: Recall the distinctive characteristics of Ordinary Differential Equations, Graph Theory and Laplace Transform.

M 201.2: Understand the theoretical workings of various algorithms related to graph theory and the theorems of differential equation and Laplace transforms.

M 201.3: Apply the principles of differential equation, graph theory and Laplace transforms to .

Computer Fundamentals & Principle of Computer Programming

Code: CS 201

Course Outcome:

CS201.1 Understanding the concept of input and output devices of Computers and how it works and recognize the basic terminology used in computer programming.

CS201.2 Write, Compile and Debug programs in C language and use different data types for writing the programs.

CS201.3 Design programs connecting decision structures, loops and functions.

CS201.4 Explain the difference between call by value and call by address.

CS201.5 Understand the dynamic behavior of memory by the use of pointers.

Paper Name: Engineering Thermodynamics & Fluid Mechanics

Paper Code: ME 201

Course Outcome:

Upon successful completion of this course, the student will be able to:

ME 201.1 Know about thermodynamic equilibrium, heat & work transfer, First law and its application.

ME 201.2 Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.

ME 201.3 Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)

ME 201.4 Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations

Paper Name: Computer Fundamentals & Principle of Computer Programming Lab

Paper Code: CS291

Course Outcome:

CS291.1. Understanding the working of different operating systems like DOS, Windows, Linux.

CS291.2. Write, Compile and Debug programs in C language.

CS291.3. Design programs connecting decision structures, loops.

CS291.4. Exercise user defined functions to solve real time problems.

CS291.5. Inscribe C programs using Pointers to access arrays, strings, functions, structures and files.

Paper Name: Mathematics –III**Paper Code: M301****Course Outcome:**

On successful completion of the learning sessions of the course, the learner will be able to:

M 301.1: Recall the distinctive characteristics of mathematical approaches like Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equation, Partial Differential Equations.

M 301.2: Understand the theoretical workings of mathematical approaches like Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equations, and Partial Differential Equations to evaluate the various measures in related field.

M 301.3: Apply various principles of Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equations, Partial Differential Equations to solve various problems.

Paper Name: Digital Electronics**Paper Code: EC (EE) 301****Course Outcome:**

The students will be able to:

CO1: Acquired knowledge about solving problems related to number systems conversions and Boolean algebra and design logic circuits using logic gates to their simplest forms using De Morgan's Theorems; Karnaugh Maps.

CO2: Design of combinational circuits

CO3: Design of various synchronous and asynchronous sequential circuits using State Diagrams & Tables.

CO4: Understand DAC & ADC technique and corresponding circuits

CO5: Analyze logic family interfaces, switching circuits & memory storage devices to Plan and execute projects.

Paper Name: ANALOG ELECTRONIC CIRCUITS**Paper Code: EC (EE) 302****Course Outcome:**

CO1: Students will be able to design D.C power supplies.

CO2: Students will be able to analyze transistor amplifier circuit.

CO3: Students will be able to understand effects of different feedback mechanism in amplifier circuit.

CO4: Students will be able to analyze signal generator Circuit.

CO5: Student will be able to design power amplifier circuit.

CO6: Students will be able to understand linear and nonlinear applications of OPAMP (I.C-741).

Paper Name: CIRCUIT THEORY & NETWORKS**Paper Code: EE301****CO Statement**

EE301.1 Know the basic concepts of electric & magnetic circuits and define associated terms

EE301.2 Know operation of different OP-amp based filters

EE301.3 Understand and analysis transient and steady-state response of any electrical circuit/network by applying different circuit analysis methods.

Paper Name: FIELD THEORY

Paper Code: EE302

CO Statement

EE302.1 Know the orthogonal co-ordinates & their transformation to solve & analyze problems on vector calculus

EE302.2 Know the basic laws of electrostatics and electromagnetism and define associated terms

EE302.3 Understand Maxwell's equation in different forms

EE302.4 Understand the propagation of EM waves associated with power system transmission Line

Paper Name: Thermal Power Engineering

Paper Code: ME (EE) 301

Course Outcome:

Upon successful completion of this course, the student will be able to:

1. Get detailed knowledge on the working principle of mountings and accessories of fire tube and water tube boilers.
2. Understand draught systems and carry out heat balance of a power plant to evaluate efficiency.
3. Analyze the working of steam nozzles and variety of turbines to carry out design based project works and solution of industrial problems
4. Evaluate the performance of I.C Engines and Gas turbines.

Paper Name: ANALOG & DIGITAL ELECTRONIC CIRCUIT

Paper Code: EC (EE) 391

Course Outcome:

CO1: Able to understand the fundamental concepts and techniques used in digital electronics.

CO2: Able to understand and examine the structure of various number systems, De-Morgan's law, Boolean algebra and its application in digital design.

CO3: Able to understand, analyse the analog circuits pertaining to applications like amplifier, oscillators and timer.

CO4: Able to know how to interface digital circuits with ADC & DAC.

Paper Name: CIRCUIT THEORY AND NETWORK LAB

Paper Code: EE391

Course Outcome:

EE391.1 Demonstrate transient analysis of electric circuits frequency response characteristics of Filter circuits

EE391.2 Simulate electric circuits, signals, algorithms using software simulator

Paper Name: THERMAL POWER ENGINEERING LABORATORY

Paper Code: ME(EE)391

Course Outcome:

Upon successful completion of this course, the student will be able to:

1. Understand operations of different type of Boilers, their mountings and accessories.
2. Evaluate the performance of a four stroke engine with varying load and speed.
3. Carry out the heat balance of an I C Engine for design and development of solution.
4. Determine calorific value of a fuel useful for future project works.

Paper Name: Technical Report Writing & Language Practice

Paper Code: HU 381

Course outcome: To maximize exposure and train students in the professional use of English in the globalized workplace.

Paper Name: Physics-II

Paper Code: PH 401

PH401.1: state Basic postulates of Quantum Mechanics Macro state and micro state for thermodynamic system. Thermodynamic probability and phase space Properties of Nano material. Polarization Bloch Theorem Assumptions of Kronig-Penny Model

PH401.2: explain Energy levels and energy states. Distribution functions of Classical and quantum statistics. Concept of quantum well, quantum wire and quantum dots. Quantum confinement. Different types of polarizability. Dielectric loss. Ferroelectric and Piezoelectric materials. Ferromagnetic Hysteresis Loop E-k diagram and Brillouin zone and crystal momentum Nuclear Binding Energy

PH401.3: apply the knowledge of Schrödinger equation in problems of junction diode, tunnel diode, 1-D potential box, 3-D potential box. Nano-range and various types of nano materials. Fermi Dirac statistics to metals and semiconductors. Local electric field and Lorentz field in Clausius-Mossotti equation. M , B , H and χ in realizing Curie law for different magnetic materials Weiss molecular field theory in realizing Curie- Weiss law for Ferromagnetic materials Soft and hard ferromagnets in different storage devices and other applications. Free electron theory in deriving Weidemann and Franz law, Kronig-Penny Model to classify different solid materials (metal, semiconductor, and insulator) based on characteristics of allowed and forbidden energy band. Hall Effect to interpret its application in various real life situations. Liquid drop model in Nuclear Fission and Fusion

Paper Name: ELECTRICAL MACHINES – I

Paper Code: EE401

Course Outcome:

EE401.1 Know the Electromechanical Energy Conversion principle and concept of magnetic to understand the basic principles of electrical machine and define terms associated with rotating electrical machine.

EE401.2 Based on different type of requirement know the applications of d.c. machine, induction motor and transformer for a given application

EE401.3 Understand the principle of operation and know performance of d.c. machine, induction motor and transformer.

EE401.4 Know different tests on electrical machine and determine the performance of d.c. machine, induction motor and transformer.

Paper Name: Electrical & Electronics Measurement

Paper Code: EE402

Course Outcome:

EE402.1 Understand the basics of Electrical measuring system.

EE402.2 Study the measurement of Resistance, Inductance, Capacitance, Power, Energy, PF and Insulation resistance.

EE402.3 Study different measuring instruments.

Paper Name: NUMERICAL METHODS

Paper Code: M(CS) 401

Course Outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

M(CS) 401.1: Recall the distinctive characteristics of various numerical techniques and the associated error measures.

M(CS) 401.2: Understand the theoretical workings of various numerical techniques and to solve the engineering problems.

M(CS) 401.3: Apply the principles of various numerical techniques to solve various problems.

Paper Name: Data Structures

Paper Code: CS(EE)402

Course Outcome:

On completion of the course students will be able to

CS301.1: Differentiate how the choices of data structure & algorithm methods impact the performance of program.

CS301.2: Solve problems based upon different data structure & also write programs.

CS301.3: Identify appropriate data structure & algorithmic methods in solving problem.

CS301.4: Discuss the computational efficiency of the principal algorithms for sorting, searching, and hashing

CS301.5: Compare and contrast the benefits of dynamic and static data structures implementations.

Paper Name: PHYSICS-II

Lab Paper Code: PH 491

Course Outcome:

PH 491.1: demonstrate Dipolar magnetic behaviour Action of capacitors Fermi levels and band gap in a semiconductor Function of Light emitting diode Magnetic and semiconductor storage devices Motion of electron under cross fields

PH 491.2: conduct experiments using Insulators, Semiconductors (extrinsic and intrinsic), Light emitting diodes Cathode ray oscilloscope Various types of magnetic materials

PH 491.3: Function effectively as an individual, and as a member or leader in laboratory sessions

PH 491.4: communicate effectively, write reports and make effective presentation using available Technology

Paper Name: ELECTRICAL MACHINES – I

Paper Code: EE 491

Course Outcome:

EE491.1 Perform different tests on d.c. machine, induction motor and transformer

EE491.2 Interpret the observed result using theoretical knowledge and hence calculate unknown parameters

Paper Name: Electrical & Electronics Measurement Lab

Paper Code: EE 492

Course Outcome:

EE492.1 Conduct experiment to measure of Resistance, Inductance, Capacitance, Power, and Energy.

Paper Name: NUMERICAL METHODS

Paper Code: M(CS) 491

Course outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

M(CS) 491.1: Apply the programming skills to solve the problems using multiple numerical approaches.

M(CS) 491.2: Analyze if the results are reasonable, and then interpret and clearly communicate the results.

Paper Name: Data Structures Lab

Paper Code: CS(EE)492

Course Outcome:

On completion of the course students will be able to

CS(EE)492.1 Choose appropriate data structure as applied to specified problem definition.

CS(EE)492.2 Handle operations like searching, insertion, deletion, traversing mechanism on various data structures.

CS(EE)492.3 Have practical knowledge on the applications of data structures.

CS(EE)492.4 Able to store, manipulate and arrange data in an efficient manner.

CS(EE)492.5 Able to implement queue and stack using arrays and linked list. Implementation of queue, binary tree and binary search tree.

Paper Name: Technical skill Development

Paper Code: MC 481

Course Outcome:

On completion of the course students will be able to

MC 481.1 Prepare lists of material for a mini project.

MC 481.2 Design an electric circuit as per the requirement of application.

Paper Name: ENVIRONMENTAL SCIENCE

Paper Code: HU 501

Course Outcome(s)

To understand the natural environment and its relationships with human activities.

To apply the fundamental knowledge of science and engineering to assess environmental and health risk.

To develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations.

Acquire skills for scientific problem-solving related to air, water, noise & land pollution.

Paper Name: ELECTRICAL MACHINES – II

Paper Code: EE501

Course Outcome:

EE501.1 Based on different type of requirement know the applications of synchronous machine and fractional kW motors for a given application.

EE501.2 Understand the principle of operation and know performance of synchronous machine and fractional kW motors.

EE501.3 Know different tests on electrical machine and determine the performance of synchronous machine.

Paper Name: Power System-I

Paper Code: EE502

Course Outcome:

EE502.1 Understand the concept of power system, know various power system components and define associated terms.

EE502.2 Know different type of power generation

EE502.3 Understand basic performances of power system

Paper Name: CONTROL SYSTEMS-I

Paper Code: EE503

Course Outcome:

EE503.1 Get knowledge of basic structure of control systems, define basic terminologies, components

EE503.2 Modeling physical systems using transfer function to analyze system dynamic and steady state behavior

EE503.3 Understand the concept of feedback system and controllers, design compensators in frequency domain

Paper Name: Microprocessor and Microcontroller

Paper Code: EE504

Course Outcome:

CO1 Able to correlate the architecture , instructions, timing diagrams, addressing modes, memory interfacing, interrupts, data communication of 8085

CO2 Able to interpret the 8086 microprocessor-Architecture, Pin details, memory segmentation, addressing modes, basic instructions, interrupts

CO3 Recognize 8051 micro controller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o, interrupts

CO4 Apply instructions for assembly language programs of 8085, 8086 and 8051

CO5 Design peripheral interfacing model using IC 8255, 8253, 8251 with IC 8085, 8086 and 8051.

Paper Name: ELECTRICAL MACHINES – II LAB

Paper Code: EE591

Course Outcome:

EE591.1 Perform different tests on synchronous machine and single phase induction motor

EE591.2 Interpret the observed result using theoretical knowledge and hence calculate unknown parameters

Paper Name: Power System-I LAB

Paper Code: EE592

Course Outcome:

EE 502.1 Able to estimate performance of Transmission Line and Distribution line

EE502.2 Able to select line support for a particular TL

EE502.3 Able to explain methods of active and reactive power control.

EE502.4 Able to test the reliability of different components of TL and Distribution Line

Paper Name: CONTROL SYSTEM-I LAB

Paper Code: EE593

Course Outcome:

EE503.1 Simulate, analyze system behavior using software simulator/hardware

EE503.2 Design compensators, controllers to meet desired performance of system.

Paper Name: Microprocessor and Microcontroller Lab

Paper Code: EE594

Course Outcome:

CO1 Able to solve small assignments using the 8085 basic instruction sets and memory mapping through trainer kit and simulator.

CO2 Able to write 8085 assembly language programs like Addition, Subtraction, Multiplication, Square, Complement, Look up table, Copying a block of memory, Shifting ,Packing and unpacking of BCD numbers, Ascending order, Descending order etc. using trainer kit.

CO3 Able to validate the interfacing technique using 8255 trainer kit through subroutine calls and IN/OUT instructions like glowing LEDs accordingly, stepper motor rotation etc.

CO4 Able to test fundamental of 8051 programs using the trainer kit.

Paper Name: Electrical System Design

Paper Code: EE581

Course Outcome:

CO1 Able to design electrical systems.

CO2 Able to develop an idea of preparing bill of materials for a particular design

Paper Name: CONTROL SYSTEMS-II**Paper Code: EE 603****Course outcome:**

EE601.1: express and solve system equations in state-variable form (state variable models).

EE601.2: Students will be able to analyze and design of discrete time control systems using z transform.

EE601.3: Students will be able to examine the stability of nonlinear systems using appropriate methods.

Paper Name: Power System –II**Paper Code: EE602****Course outcome:**

EE 602.1: Learn about advance structure of power system.

EE 602.2: Get depth knowledge of different types of power system protection, fault, stability analysis and load flow method.

EE 602.3: Design and analysis of different types of substation and implement these ideas in industry or real life problem solve.

Course Name: Power Electronics**Course Code: EE603****Course Outcome**

On successful completion of the learning sessions of the course, the learner will be able to:

EE603.1: Acquire knowledge about fundamental concepts and techniques used in power electronics.

EE603.2: Analyze various single phase and three phase power converter circuits and understand their applications.

EE603.3: Identify basic requirements for power electronics based design application.

EE603.4: Develop skills to build, and troubleshoot power electronics circuits.

EE603.5: Understand the use of power converters in commercial and industrial applications.

Paper Name: Digital Signal Processing**Paper code: EC(EE)604****Course outcomes:**

Able to define discrete systems in the Frequency domain using Fourier analysis tools like DFT, FFT.

Able to interpret the properties of discrete time signals in time domain and frequency domain.

Able to describe finite word length effects and digital filters.

Able to analyse convolution for long sequences of data.

Able to implement digital filters.

Paper Name: Non-Conventional Energy sources and applications**Paper Code: EE605A****Course outcome:**

EE605A.1 Student will be able to understand the importance of Renewable energy over conventional process and learn different methods of Power generation from the Non- conventional sources like Solar, Wind Energy, Biomass, Geothermal energy, OTEC, Tidal energy ,MHD Power generation schemes.

EE605A.2: Students will be able to analyze the different techniques of grid integration of the power generated from renewable energy sources with the initiation of power electronic converters and drives.

EE605A.3 Students will be able to design different hybrid energy systems and energy storage systems.

Paper Name: Introduction to Robotics**Paper Code: EE 605C****CO Statement**

EE 605C.1 Demonstrate the basics knowledge and skills in practical robotics applications

EE 605C.2 Ability to apply mechanical structures of industrial robots and their operational workspace characteristics

EE 605C.3 Students will demonstrate knowledge of robot controllers.

EE 605C.4 Understand and demonstrate an ability to simulate, program, and control commercial Robots through hands-on experiments

EE 605C.5 Understand industrial environment for robotics system

Course Name: MECHATRONICS**Course Code : EE605D****Course Outcome**

After successful completion of the course students:

CO 1: Can realize the importance of mechatronic system to perform complex tasks, can elaborate the step wise integration of sensors & actuators, control sytem, signal processing, power electronics.

CO 2: will be able to demonstrate basic operations of PLC , different control theory and understand mechatronic applications .

Introduction to JAVA**Code: CS(EE)606A****Course Outcome**

CO1: Design the process of interaction between Objects,classes & methods w.r.t. Object Oriented Programming

CO2: Acquire a basic knowledge of Object Orientation with different properties as well as different features of Java.

CO3 Analyze various activities of different string handling functions with various I/O operations.

CO4: Discuss basic Code Reusability concept w.r.t. Inheritance, Package and Interface

CO5: Implement Exception handling, Multithreading and Applet (Web program in java) programming concept in Java

Paper Name: Software Engineering

Code: CS(EE) 606D

Course Outcomes

CS(EE)606.1 To identify, formulate, and solve software engineering problems, including the specification, design, implementation, and testing of software systems that meet specification, performance, maintenance and quality requirements

CS(EE)606.2 To analyze, elicit and specify software requirements through a productive working relationship with various stakeholders of the project

CS(EE) 606.3 To design applicable solutions in one or more application domains using software engineering approaches that integrates ethical, social, legal and economic concerns.

CS(EE)606.4 To acquire the ability to function effectively in teams.

CS(EE)606.5 To develop the code from the design and effectively apply relevant standards and perform testing, and quality management and practice.

CS(EE)606.6 To identify modern engineering tools necessary for software project management, time management and software reuse, and an ability to engage in life-long learning.

Paper Name: Control System 2 Lab

Code : EE 691

Course Outcome

EE691.1: Student will be able to perform experiments on nonlinearity.

EE691.2: Student will be able to take initiative to identify, formulate and analyse problems regarding lead-lag compensation, state variable analysis using simulation tools.

EE691.3: Student will be able to write report on the performed experiment.

EE691.4: Student will be able to perform the experiment effectively as an individual using MATLAB and hardware equipment.

EE691.5: Student will be able to provide meaningful solutions by applying knowledge acquired in non linear control system.

EE691.6: Student will be able to function as a member or leader in team regularly.

Paper Name: Power System II Lab

Paper Code: EE692

Course Outcome

Course Outcome On completion of the course students will be able to

EE692.1: Analyze the testing, operation and response of protection of electrical instruments.

EE692.2: Conduct experimental investigation and gain knowledge of various parts of relays and its operation.

EE692.3: Able to incorporate the measuring error with actual value and calibrate the instruments transformer.

EE692.4: Enhance the capability of software analysis by load flow solution in ETAP, Mat Lab etc.

Course Name: Power Electronics Laboratory

Course Code: EE693

Course Outcome

On successful completion of the learning sessions of the course, the learner will be able to:

- 693.1: The skill to analyze the response of any power electronics devices.
- 693.2. The ability to troubleshoot the operation of an power electronics circuit.
- 693.3. The ability to select suitable power electronic devices for a given application.
- 693.4. The ability to know how to control and convert output signal as per requirements.
- 693.5. The ability to construct any power electronics circuits as needed in operation.

Course Name: Electrical System Design-II

Course Code: EE681

Course Outcome

On completion of the course students will be able to

- ESD 681.1: Gain knowledge of designing a system.
- ESD 681.2: Synchronize different machines in a system.
- ESD 681.3: Use of theoretical designing concept to implement a practical model.
- ESD 681.4: Estimate and planning system.

Name of the Paper: Software Engineering Lab

Paper Code: CS(EE)696D

Course Outcomes

- CS(EE)696D.1 To handle software development models through rational method.
- CS(EE)696D.2 To prepare SRS document, design document, test cases and software configuration management and risk management related document.
- CS(EE)696D.3 To Develop function oriented and object oriented software design using tools like rational rose.
- CS(EE)696D.4 To perform unit testing and integration testing
- CS(EE)696D.5 To apply various white box and black box testing techniques

Paper Name: ELECTRIC DRIVES

Paper Code: EE701

Course Outcomes:

- EE701.1. Student will be able to select electric motors for a particular drive based on their characteristics.
- EE701.2. Student will be able to accrue the knowledge of speed-control of DC motors and Induction motors.
- EE701.3. Student will be able to accrue the knowledge of power electronic converters used for DC motor and Induction motor speed control.

Sub Name : Utilization of Electric Power

Code:- EE 702A

Course Outcomes (COs):

- Ability to formulate and then analyze the working of traction motor & their control using mathematical model under loaded and unloaded conditions.
- Ability to understand and explain the principle of operation and performance of traction motor.
- Skill to analyze the response of d.c. motor, induction motor and transformer.

Ability to troubleshoot the operation of d.c. motor, induction motor and transformer.

Ability to analyze the working of Electric Heating, welding processes.

Ability to calculate illumination level for a given application and then select the suitable specification for installation.

Paper Name: Advanced Power Electronics

Paper Code: EE702B

Course Outcomes (COs):

CO1: Describe the basic concepts of resonant converters, matrix converter and multilevel inverter

CO2: Describe the basic concepts of matrix converter and multilevel inverter

CO3: Apply the knowledge of contemporary technical issues in Power electronics field and Compensators currently used in modern industries.

Paper Name: Advance Power System

Paper Code: EE703A

Course outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

EE 703A.1: Acquire in-depth advance knowledge in the domain of modern and industrial oriental power systems.

EE 703A.2: Ability to critically analyze various power systems components, models and their operation, optimization of cost criteria.

EE 703A.3: Ability to apply fundamentals and concepts to analyze, formulate and solve complex problems of electrical power systems and its components and control of frequency and voltages.

EE 703A.4: Ability to use advanced techniques, skills and modern scientific and engineering tools for professional practice for power system to enhanced power quality, Stability, reliability, security and load ability.

Paper Name: Power Generation and Economics

Paper Code: EE 703B

Course Outcomes:

At the end of the course, a student will be able to:

1. Describe and analyze different types of sources and mathematical expressions related to with power generation and economics.

2. Combine concepts of previously learnt courses to define the working principle of diesel power plant, its layout, safety principles and compare it with plants of other types.

3. Discuss the working principle and basic components of the steam power plants, hydro electric plants, nuclear power plant and the economic principles and safety precautions involved with it.

4. Discuss and analyze the mathematical and working principles of different electrical equipments involved in the generation of power

5. Solve the problems related to the economic dispatch of power, plant scheduling, unit commitment and formulate strategies to minimize transmission line losses and penalties imbibed & analyze various power systems components, models and their operation, optimization of cost criteria

6. Use advanced techniques, skills and modern scientific and engineering tools for professional practice for power system to enhanced power quality, reliability, security and load ability.

Name of the Paper: COMPUTER NETWORKING

Paper Code: CS(EE)705C

Course Outcome(s)

CO1: Understand OSI and TCP/IP models.

CO2: Analyze MAC layer protocols and LAN technologies.

CO3: Design applications using internet protocols.

CO4: Implement routing and congestion control algorithms.

CO5: Develop application layer protocols and understand socket programming

DATABASE MANAGEMENT SYSTEM

CS(EE)705D

Course Outcomes(COs)

On completion of the course students will be able to

1. Apply the knowledge of Entity Relationship (E-R) diagram for an application.
2. Create a normalized relational database model
3. Analyze real world queries to generate reports from it.
4. Determine whether the transaction satisfies the ACID properties.
5. Create and maintain the database of an organization.

Paper Name: VALUE AND ETHICS IN PROFESSION

Paper Code: HU 702

Course Outcome:

On Completion of this course student will be able to

Co.1 Understand the core values that shape the ethical behaviour of an engineer and Exposed awareness on professional ethics and human values.

Co.2 understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories

Co.3 understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field

Co.4 Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.

Co.5 acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives

Paper Name: ELECTRIC DRIVES LAB

Paper Code: EE791

Course Outcomes:

EE791.1 Student will be able to apply power electronic converters for motor speed control

EE791.2 Student will be able to analyze the characteristics of electric motors for different type of loads.

Name of the Paper: COMPUTER NETWORKING Lab

Paper Code: EE795C

Course Outcome(s)

- CO1: Demonstrate the socket program using TCP & UDP.
CO2: Develop simple applications using TCP & UDP.
CO3: Develop the code for Data link layer protocol simulation.
CO4: Examine the performances of Routing protocol.
CO5: Experiment with congestion control algorithm using network simulator

DATABASE MANAGEMENT SYSTEM LAB**CS(EE)795D****Course Outcome(s)**

On completion of the course students will be able to

1. Understand the basic concepts regarding database, know about query processing and techniques involved in query optimization and understand the concepts of database transaction and related database facilities including concurrency control, backup and recovery.
2. Understand the introductory concepts of some advanced topics in data management like distributed databases, data warehousing, deductive databases and be aware of some advanced databases like partial multimedia and mobile databases.
3. Differentiate between DBMS and advanced DBMS and use of advanced database concepts and become proficient in creating database queries.
4. Analyze database system concepts and apply normalization to the database.
5. Apply and create different transaction processing and concurrency control applications.

Course Name: HVDC TRANSMISSION**Course Code: EE-801A****Course Outcome**

On successful completion of the learning sessions of the course, the learner will be able to:

- CO1: Acquire knowledge of HVDC transmission and HVDC converters and the applicability and advantage of HVDC transmission over conventional AC transmission.
CO2: Formulate and solve mathematical problems related to rectifier and inverter control methods and learn about different control schemes as well as starting and stopping of DC links.
CO3: Analyze the different harmonics generated by the converters and their variation with the change in firing angles.
CO4: Study and understand the nature of faults happening on both the AC and DC sides of the converters and formulate protection schemes for the same.
CO5: Understand the existing HVDC systems along with MTDC systems and modern transmission system.

Paper Name: Energy management & audit**Paper Code: EE801B****Course Outcome :**

On completion of the course students will be able to

1. Identify the demand supply gap of energy in Indian scenario
2. Carry out energy audit of an industry/Organization.
3. Draw the energy flow diagram of an industry and identify the energy wasted or a waste stream.

4. Select appropriate energy conservation method to reduce the wastage of energy.
5. Evaluate the techno economic feasibility of the energy conservation technique adopted.

Paper Name: Sensors and Transducers

Paper Code: EE802A

Course Outcome:

EE802A.1: Students should be able to illustrate the fundamental principles of various types of sensors.

EE802A.2: Students should be able to compare the different types of transducers available.

EE802A.3: Students should be familiar with criteria to recommend appropriate sensors to perform engineering tasks and scientific researches.

EE802A.4: Students will be able to understand the design of different Sensors.

PROCESS CONTROL AND INSTRUMENTATION

Code: EE802B

Course Outcome:

Upon successful completion of the course students will be able to:

EE802B.1 Design controller by applying the knowledge of different control action

EE802B.2 Calculate controller parameters by applying different tuning methods

EE802B.3 Describe different advanced control strategy

EE802B.4 State the operation and use of final control element

EE802B.5 Develop ladder diagram

JIS College of Engineering
Department of Information Technology

1ST SEMESTER

SUBJECT NAME : MATHEMATICS–I
SUBJECT CODE : M101

Course Outcome

On successful completion of the learning sessions of the course, the learner will be able to:

- M101.1:** Recall the distinctive characteristics of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis to analyze the problems in Science & Technology.
- M101.2:** Demonstrate the theoretical concept of Matrix Algebra, Calculus of Single and Several Variables, and Vector Analysis and understand the related working principles to solve the problems in Science & Technology.
- M101.3:** Develop mathematical model of various real world scenarios using concepts of Matrix algebra, Calculus of Single and Several Variables, and Vector Analysis and solve the same, judge if the results are reasonable, and then interpret and clearly communicate the results.

SUBJECT NAME : PHYSICS –I
SUBJECT CODE : PH101

Course Outcome

After completion of the course students will be able to

PH 101.1 : Define

- De-Broglie hypothesis, and Heisenberg's Uncertainty Principle
- Amplitude and Velocity Resonance
- Malus's Law, Brewster's Law
- Characteristics of LASER light
- Intrinsic and extrinsic semiconductor.

PH 101.2 : Explain

- Polarizer and analyzer
- basic principles and different types of LASER and Optical Fibre
- structure of solids, Miller indices
- theory of Matter Wave, equation of motion of Matter Wave
- wave function and its role in representing wave nature of matter
- p-n junction.

PH 101.3 : Apply the knowledge of

- mechanical vibration in electrical circuits
- superposition principle in Newton's ring phenomenon, diffraction phenomenon
- quantum nature of e.m. waves for production of laser
- total internal reflection in transmitting light through optical fibres
- x-ray diffraction in crystal structure
- probability interpretation in Heisenberg's uncertainty principle

PH 101.4 : Analyze

- grating as many slit system
- role of Q factor in a resonating circuit, conditions of different types of resonance
- minimum requirements for lasing action
- importance of light as a carrier of information
- the failures of classical physics in microscopic situation and need of quantum physics
- Einstein's A, B coefficient and predict the wavelength domain of Lasing action
- Requirement of Miller indices for describing crystallographic planes

PH 101.5 : Judge

- X-ray production process is inverse of the process of Photoelectric Effect.
- different crystallographic structures according to their Co-ordination number and packing factors
- the outcome of Photo-electric effect, Compton effect and Davission-Germer experiment to justify wave-particle duality of matter

SUBJECT NAME : BASIC ELECTRONICS ENGINEERING
SUBJECT CODE : EC101

Course Outcome

On successful completion of the learning sessions of the course, the learner will be able to:

- EC101.1:** Demonstrate the concept of Conductors, Insulators, and Semiconductors based on energy-band theory and analyze relevant problems
- EC101.2:** Explain the working principles of P-N Junction Diode, zener diode and analyze their applications in the rectifier, clipper, clamper, regulator etc.
- EC101.3:** Analyze characteristics of bipolar junction transistor (BJT) under CE, CE, CC mode of operation and its biasing therein
- EC101.4:** Distinguish the operations of JFET, MOSFET and demonstrate their operations under CG, CS, CD configurations
- EC101.5:** Determine parameters in Operational Amplifier circuit design for various applications

SUBJECT NAME : ENGINEERING MECHANICS
SUBJECT CODE : ME101

Course Outcome

On successful completion of the learning sessions of the course, the learner will be able to:

- ME101.1:** Construct free body diagram and calculate the reactions necessary to ensure static equilibrium.
- ME101.2:** Study the effect of friction in static and dynamic conditions.
- ME101.3:** Understand the different surface properties, property of masses and material properties.
- ME101.4:** Analyze and solve different problems of kinematics and kinetics.

SUBJECT NAME : COMMUNICATIVE ENGLISH
SUBJECT CODE : HU101

Course Outcome

On successful completion of the learning sessions of the course, the learner will be able to:

- HU101.1:** Able to comprehend and communicate in English through exposure to communication skills theory and practice.
- HU101.2:** Apply the basic grammatical skills of the English language through intensive practice.
- HU101.3:** Able to develop reading and comprehension skills.
- HU101.4:** Able to develop writing proficiency skills by writing Official Letters, Technical report, memo, notice, minutes, agenda, resume, curriculum vitae.
- HU101.5:** Able to apply all sets of English language and communication skills in creative and effective ways in the professional sphere of their life

SUBJECT NAME : PHYSICS-I LAB
SUBJECT CODE : PH191

Course Outcome:

After completion of this course student will be able to

- PH191.1:** Define, understand and explain
 - ✓ Error estimation, Proportional error calculation
 - ✓ superposition principle in Newton's ring, Fresnel's biprism, laser diffraction
 - ✓ Basic circuit analysis in LCR circuits
- PH191.2:** Conduct experiments using
 - ✓ LASER, Optical fibre

- ✓ Interference by division of wave front, division of amplitude, diffraction grating, polarization of light
- ✓ Quantization of electronic energy inside an atom
- ✓ Torsional pendulum
- ✓

PH191.3: Able to participate as an individual and as a member or leader in groups in laboratory sessions actively

PH191.4: Ability to analyze experimental data from graphical representations and to communicate effectively them in Laboratory reports including innovative experiments

SUBJECT NAME : BASIC ELECTRONICS ENGINEERING LAB
SUBJECT CODE : EC191

Course Outcome

After completion of this course student will be able to

- EC191.1:** Identify different types of passive and active electronic components, apply signals through signal generators and measure signals using CRO, Multimeter etc
- EC191.2:** Demonstrate and analyze the characteristics for PN junction diode, Zener diode.
- EC191.3:** Describe the regulator circuit and analyze the parametric observation
- EC191.4:** Demonstrate and analyze the characteristics for BJT, FET.
- EC191.5:** Explain the limits on observation of various parameters of OP-AMP.

SUBJECT NAME : WORKSHOP PRACTISE
SUBJECT CODE : ME192

Course Outcome:

After completion of this course student will be able to

- ME192.1** Gain basic knowledge of Workshop Practice and Safety useful for our daily living. Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and
- ME192.2** performing operations like such as Marking, Cutting etc used in manufacturing processes.
- ME192.3** Gain knowledge of the various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.
- ME192.4** Get hands on practice of in Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

SUBJECT NAME : LANGUAGE LAB AND SEMINAR PRESENTATION
SUBJECT CODE : HU191

Course Outcome:

After completion of this course student will be able to

- HU191.1** Able to understand advanced skills of Technical Communication in English through Language Laboratory.
- HU191.2** Able to apply listening, speaking, reading and writing skills in societal and professional life.
- HU191.3** Able to demonstrate the skills necessary to be a competent Interpersonal communicator.
- HU191.4** Able to analyze communication behaviors.
- HU191.5** Able to adapt to multifarious socio economical and professional arenas with the help of effective communication and interpersonal skills.

2ND SEMESTER

SUBJECT NAME : MATHEMATICS-II

SUBJECT CODE : M201

Course Outcome

After completion of this course student will be able to

M201.1: Recall the distinctive characteristics of Ordinary Differential Equations, Graph Theory and Laplace Transform to analyze the problems in Science & Technology.

M201.2: Demonstrate the theoretical concept of Ordinary Differential Equations, Graph Theory and Laplace Transform and understand the related working principles to solve the problems in Science & Technology.

M201.3: Develop mathematical model of various real world scenarios using concepts of Ordinary Differential Equations, Graph Theory and Laplace Transform and solve the same, judge if the results are reasonable, and then interpret and clearly communicate the results.

SUBJECT NAME : CHEMISTRY

SUBJECT CODE : CH201

Course Outcome

After completion of this course student will be able to

CH201.1: Apply fundamental concepts of thermodynamics in different engineering applications.

CH201.2: Apply the knowledge of chemical reactions and chemistry of fuel to industries, scientific and technical fields.

CH201.3: Design different types of cell and semiconductor based devices.

CH201.4: Apply the knowledge of corrosion to prevent different metals from Corrosion.

CH201.5: Identify different types of Organic reaction from the basic concept of Organic Chemistry

CH201.6: Prepare different types polymer materials as per their application.

CH201.7: Solve the industrial problem from the concept of nano science and water quality parameter

SUBJECT NAME : BASIC ELECTRICAL ENGINEERING

SUBJECT CODE : EE201

Course Outcome

After completion of this course student will be able to

EE201.1: Predict the behavior of any electrical and magnetic circuits.

- EE201.2:** Formulate and solve complex AC, DC circuits.
- EE201.3:** Identify the type of electrical machine used for that particular application.
- EE201.4:** Realize the requirement of transformers in transmission and distribution of electric power and other applications.
- EE201.5:** Function on multi-disciplinary teams.

SUBJECT NAME : COMPUTER FUNDAMENTALS & PRINCIPLE OF COMPUTER PROGRAMMING
SUBJECT CODE : CS201

Course Outcome

After completion of this course student will be able to

- CS201.1:** Understands the concept of anatomy of computer and differentiate among different programming languages for problem solving.
- CS201.2:** Analyze real life problems and design algorithm.
- CS201.3:** Apply the concept of conditional and iterative statements to write C programs.
- CS201.4:** Execute arrays, functions, pointers, structures and apply these concepts to solve real time problems.
- CS201.5:** Create a significant project using the concept of C programming.

SUBJECT NAME : ENGINEERING THERMODYNAMICS & FLUID MECHANICS
SUBJECT CODE : ME201

Course Outcome

After completion of this course student will be able to

- ME201.1:** Know about thermodynamic equilibrium, heat & work transfer, First law and its application.
- ME201.2:** Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.
- ME201.3:** Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)
- ME201.4:** Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations.

SUBJECT NAME : CHEMISTRY LAB
SUBJECT CODE : CH291

Course Outcome

After completion of this course student will be able to

- CH291.1:** Measure water quality parameters like alkalinity, hardness and amount of dissolved oxygen, Chloride ions, iron etc. to be applied for industrial purpose.
- CH291.2:** Measure the conductivity and pH value of different solutions.
- CH291.3:** Fabricate polymer based materials (e.g. Bakelite) which is used to form electrical insulator parts.
- CH291.4:** Measure the oxidizing and reducing power of materials.
- CH291.5:** Synthesize nano particles for catalytic and medicinal activities.

SUBJECT NAME : COMPUTER FUNDAMENTALS & PRINCIPLE OF COMPUTER PROGRAMMING LAB
SUBJECT CODE : CS291

Course Outcome

After completion of this course student will be able to

- CS291.1:** Understand the concept of data types, loops, functions, array, pointers, string, structures and files.
- CS291.2:** Design flow-chart, algorithm and program logic.
- CS291.3:** Analyze problems, errors and exceptions.
- CS291.4:** Apply programming concepts to compile and debug c programs to find solutions.

SUBJECT NAME : BASIC ELECTRICAL ENGINEERING LAB
SUBJECT CODE : EE291

Course Outcome

After completion of this course student will be able to

- EE291.1:** Analyze the response of any electrical circuit and network
- EE291.2:** Troubleshoot the operation of an electrical apparatus
- EE291.3:** Select a suitable measuring instrument for a given application
- EE291.4:** Gain the knowledge of various parts and test of DC machine and transformer
- EE291.5:** Incorporate the measuring error with actual value and calibrate the instruments

SUBJECT NAME : ENGINEERING DRAWING & GRAPHICS
SUBJECT CODE : ME291

Course Outcome

After completion of this course student will be able to

- ME291.1:** Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.
- ME291.2:** Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.
- ME291.3:** Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.

ME291.4: Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

SUBJECT NAME : SOFT SKILL DEVELOPMENT
SUBJECT CODE : MC281

Course Outcome

After completion of this course student will be able to

MC281.1: Understand the communication skill in social and professional fields.

MC281.2: Apply good communication skills in technical fields.

MC281.3: Develop good communication skills and all-round personalities with a mature outlook to function effectively

3RD SEMESTER

SUBJECT NAME : MATHEMATICS –III
SUBJECT CODE : M(IT)301

Course Outcome

After completion of this course student will be able to

M(IT)301.1: Recall the distinctive characteristics of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis, Algebraic Structures, Linear Algebra, Advanced graph Theory.

M(IT)301.2: Understand the theoretical workings of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis, Algebraic Structures, Linear Algebra, Advanced Graph Theory to evaluate the various measures and forms in related field.

M(IT)301.3: Demonstrate various real world scenarios using concepts of Basic Probability and Probability Distribution, Sampling Theory, Estimation of Parameters, Testing of Hypothesis, Algebraic Structures, Linear Algebra, Advanced Graph Theory.

SUBJECT NAME : PHYSICS-II
SUBJECT CODE : PH(IT)301

Course Outcome

After completion of this course students will be able to

PH(IT)301.1: Define, understand and explain

- electrostatics, magnetostatics and electromagnetic theory
- operator formalism in Quantum Mechanics
- categories of storage devices
- materials at the low-dimensions

- fundamental particles

PH(IT)301.2: Apply the knowledge of

- Vector space & Heisenberg representation in developing knowledge of quantum bit
- Quantum bit and its representation as a two level system to design quantum logic gates
- Schrödinger equation in problems of junction diode, tunnel diode
- Magnetism and semiconductors in data storage
- Electromagnetic theory in communication and networking
- Poisson's equations in various electronic systems
- Fermi levels in intrinsic and extrinsic semiconductors

PH(IT)301.3: Analyze

- role of superposition principle in generation of large number of Qubits.
- the principle of display devices
- Which type of magnetic materials to be used for data storage purpose
- Role of quantum confinement in inducing novel feature of a nano material
- change in electric and magnetic fields in various symmetrical bodies
- Quantum gates and quantum circuits

SUBJECT NAME : NEMERICAL METHODS AND STATISTICS
SUBJECT CODE : M(IT)302

Course Outcome:

After completion of this course students will be able to

- M(IT)302.1:** Recall the distinctive characteristics of various numerical techniques and the associated error measures, different descriptive measures of Statistics, correlation and regression.
- M(IT)302.2:** Understand the theoretical workings of various numerical techniques, different descriptive measures of Statistics, correlation and regression to solve the engineering problems and demonstrate error.
- M(IT)302.3:** Develop mathematical model of various real world scenarios using concepts of mathematical approaches and solve the same by numerical techniques, judge if the results are reasonable, and then interpret and clearly communicate the results.

SUBJECT NAME : ANALOG AND DIGITAL ELECTRONICS
SUBJECT CODE : EC(IT)303

Course Outcome

After completion of this course student will be able to

- EC(IT)303.1:** Understand basic analog and digital electronics, including semiconductor properties, operational amplifiers, combinational and sequential logic and analog-to-digital digital-to-analog conversion techniques
- EC(IT)303.2:** Identify different symbols, working principles of basic Digital electronics circuits for data processing application
- EC(IT)303.3:** Analyze the characteristics of basic digital circuits

EC(IT)303.4: Design analog amplifiers, combinational logic devices and sequential logic devices like counters and registers

SUBJECT NAME : DATA STRUCTURE AND ALGORITHM

SUBJECT CODE : IT301

Course Outcome

After completion of this course student will be able to

IT301.1: Use different kinds of data structures which are suited to different kinds of applications, and some are highly specialized to specific tasks.

IT301.2: Manage large amounts of data efficiently, such as large databases and internet indexing services.

IT301.3: Use efficient data structures which are a key to designing efficient algorithms.

IT301.4: Use some formal design methods and programming languages which emphasize on data structures, rather than algorithms, as the key organizing factor in software design.

IT301.5: Store and retrieve data stored in both main memory and in secondary memory.

SUBJECT NAME : PHYSICS-II LAB

SUBJECT CODE : PH(IT)391

Course Outcomes:

At the end of the course students will be able to know to find out:

PH(IT)391.1: Examine the characteristics of analog electronic circuit devices such as BJTs and FETs, amplifiers

PH(IT)391.2: Make use of different basic logic gates and universal gates

PH(IT)391.3: Implement the combinational circuits in digital electronics using basic logic gates

PH(IT)391.4: Construct sequential circuits like registers and counters using flip-flops and basic gates

SUBJECT NAME : NEMERICAL METHODS AND STATISTICS LAB

SUBJECT CODE : M(IT)392

Course Objective: The purpose of this course is to provide basic programming skills for solving numerous problems in numerical methods and statistics.

M(IT)392.1: Write efficient, well-documented code in order to derive numerical methods for various mathematical operations and tasks, such as interpolation, differentiation, integration, the solution of linear and nonlinear equations, and the solution of differential equations.

M(IT)392.2: Present numerical results in an informative way and analyze and evaluate the accuracy of common numerical methods.

SUBJECT NAME : ANALOG & DIGITAL ELECTRONICS LAB
SUBJECT CODE : EC(IT)393

Course Outcomes:

At the end of the course students will be able to know to find out:

- EC(IT)393.1:** Examine the characteristics of analog electronic circuit devices such as BJTs and FETs, amplifiers
- EC(IT)393.2:** Make use of different basic logic gates and universal gates
- EC(IT)393.3:** Implement the combinational circuits in digital electronics using basic logic gates
- EC(IT)393.4:** Construct sequential circuits like registers and counters using flip-flops and basic gates

SUBJECT NAME : DATA STRUCTURE AND ALGORITHM LAB
SUBJECT CODE : IT391

Course Outcome:

After completion of this course student will be able to

- IT391.1:** Understand the concept of dynamic memory management, data types, basic data structures, and complexity analysis.
- IT391.2:** Introduce the concept of data structures through ADT.
- IT391.3:** Choose the appropriate linear and non-linear data structure and algorithm design method for a specified application design.
- IT391.4:** Analyze the complexity of the problems.

SUBJECT NAME : TECHNICAL REPORT WRITING AND LANGUAGE PRACTICE
SUBJECT CODE : HU 381

Course Outcomes:

At the end of the course students will be able to know to find out:

- HU381.1:** Impart skill-based lessons in a manner conducive to developing communicative and socio-linguistic competence in the learners.
- HU381.2:** Building general awareness, through guided practice, of the taxonomy of listening and speaking skills and sub-skills.
- HU381.3:** Build knowledge of the skills required for professional and public speaking so as to inculcate discourse competence in the learners.
- HU381.4:** Reinforce grammar skills and practice writing skills through the production of common industry and workplace documents.
- HU381.5:** Synthesize and integrate material from primary and secondary sources with their own ideas in research papers.

4TH SEMESTER

SUBJECT NAME : ENVIRONMENTAL SCIENCE
SUBJECT CODE : HU401

Course Outcome

After completion of this course student will be able to

- HU401.1:** Describe the structure and function of environment and different types of environmental pollution.
- HU401.2:** Identify all types of resources and learn the quality parameter to maintain proper balance.
- HU401.3:** Demonstrate environmental problems like global warming, acid rain, natural and manmade disasters.
- HU401.4:** Demonstrate the controlling method of environmental pollution and apply their knowledge for environment management.
- HU401.5:** Apply the method of synthesis of green chemistry and find green solution.

SUBJECT NAME : COMPUTER ORGANIZATION AND ARCHITECTURE
SUBJECT CODE : IT401

Course Outcome

After completion of this course student will be able to

- IT401.1:** Understand the organization of the Control unit, Arithmetic and Logical unit, Memory unit and the I/O unit.
- IT401.2:** Describe the structure and functioning of a digital computer, including its overall system architecture, operating system, and digital components.
- IT401.3:** Construct various design techniques of CPU, Memory, pipelining, ALU, interconnecting I/O devices and microprogramming in order to achieve multiprocessing.
- IT401.4:** Developed and Design quantitative performance evaluation of computer systems.

SUBJECT NAME : COMMUNICATION ENGINEERING AND CODING THEORY
SUBJECT CODE : IT402

Course Outcome

After completion of this course student will be able to

- IT402.1:** Understand basics of communication system and coding schemes.
- IT402.2:** Apply the basic concept of PCM systems and baseband transmission schemes.

- IT402.3:** Analyze and evaluate band pass signaling schemes.
IT402.4: Create spectral characteristics of band pass signaling schemes and asses noise performance.

SUBJECT NAME : FORMAL LANGUAGE AND AUTOMATA THEORY
SUBJECT CODE : IT403

Course Outcome

After completion of this course student will be able to

- IT403.1:** Analyze situations in related areas of theory in computer science
IT403.2: Model, compare and analyze different computational models using combinatorial methods
IT403.3: Apply rigorously formal mathematical methods to prove properties of languages, grammars and automata
IT403.4: Construct algorithms for different problems and argue formally about correctness on different restricted machine models of computation
IT403.5 Identify limitations of some computational models and possible methods of proving them

SUBJECT NAME : OBJECT ORIENTED PROGRAMMING USING JAVA
SUBJECT CODE : IT404

Course Outcome

After completion of this course student will be able to

- IT404.1:** Understand the key concepts of object oriented programming and have an ability to design object oriented programs and appreciate the techniques of good design
IT404.2: Understand advanced features of Java
IT404.3: Analyze complex programming problems and optimize the solutions
IT404.4: Apply an understanding of ethical principles to problems which commonly arise in the Information Technology Industry

SUBJECT NAME : COMPUTER ORGANIZATION & ARCHITECTURE LAB
SUBJECT CODE : IT491

Course Outcome

After completion of this course student will be able to

- IT492.1:** Apply the knowledge of mathematics, science, and engineering in simulation.
IT492.2: Use Hardware Description Language (HDL) in order to implement skills in designing Architectural solutions and describing designs using VHDL
IT492.3: Construct and examines digital circuit design using XLINX tool.

SUBJECT NAME : COMMUNICATION ENGINEERING & CODING THEORY LAB
SUBJECT CODE : IT492

Course Outcome

After completion of this course student will be able to

- IT492.1:** Understand amplitude modulation and its demodulation.
- IT492.2:** Apply Amplitude Modulated Signal and measurement of modulation index for the various conditions under-modulated, over modulated and critically modulated.
- IT492.3:** Evaluate and measure the frequency deviation and the modulation index of the wave.
- IT492.4:** Design and analyze PAM and its demodulation and PWM, PPM.
- IT492.5:** Create and asses Pulse code modulation, ASK FSK, BPSK demodulation.

SUBJECT NAME : OBJECT ORIENTED PROGRAMMING LAB
SUBJECT CODE : IT494

Course Outcome

After completion of this course student will be able to

- IT494.1:** Apply object oriented programming concepts in designing programs
- IT494.2:** Analyze different dimensions of a problem and provide optimal solutions
- IT494.3:** Apply the advance features of JAVA in designing of projects

**SUBJECT NAME : TECHNICAL SKILL DEVELOPMENT
(PYTHON PROGRAMMING)**
SUBJECT CODE : MC481

Course Outcome

After completion of this course student will be able to

- MC481.1:** Understanding basic of Python Programming Language.
- MC481.2:** Analyze problems and design effective solutions of them.
- MC481.3:** Apply the best features of Python to program real life problems.
- MC481.4:** Implement optimal solution of any problem.

5TH SEMESTER

SUBJECT NAME : DESIGN ANALYSIS OF ALGORITHM
SUBJECT CODE : IT501

Course Outcome

After completion of this course student will be able to

- IT501.1 Analyze the asymptotic performance of algorithms.
- IT501.2 Design the algorithms and execute rigorous correctness proofs for the algorithms.
- IT501.3 Apply important algorithmic design paradigms and methods of analysis.
- IT501.4 Synthesize efficient algorithms in common engineering design situations.

SUBJECT NAME : SOFTWARE ENGINEERING
SUBJECT CODE : IT502

Course Outcome

After completion of this course student will be able to

- IT502.1** Ability to analysis and design of complex systems and meet ethical standards, legal Responsibilities.
- IT502.2** Ability to apply software engineering principles, techniques and develop, maintain, Evaluate large-scale software systems.
- IT502.3** To produce efficient, reliable, robust and cost-effective software solutions and perform independent research and analysis.
- IT502.4** Ability to work as an effective member or leader of software engineering teams and manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals.

SUBJECT NAME : OPERATING SYSTEM
SUBJECT CODE : IT503

Course Outcome:

After completion of this course students will be able to

- IT503.1:** Analyze the structure and basic architectural components involved in OS.
- IT503.2:** Demonstrate competence in recognizing and using operating system features
- IT503.3:** Understand and analyze theory and implementation of different operating system aspect.
- IT503.4:** Apply knowledge of different operating system algorithms.

SUBJECT NAME : PROGRAMMING PRACTICE WITH C++
SUBJECT CODE : IT504A

Course Outcome

After completion of this course student will be able to

- IT504A.1:** understand the difference between object oriented programming and procedural oriented language and data types in C++.
- IT504A.2:** program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.
- IT504A.3:** simulate the problem in the subjects like Operating system, Computer networks and real world problems.
- IT504A.4:** familiarized with Computer Language environment.
- IT504A.5:** implement various concepts related to Computer Language.

SUBJECT NAME : ARTIFICIAL INTELLIGENCE
SUBJECT CODE : IT504B

Course Outcome

After completion of this course student will be able to

- IT504B.1:** Understand different types of AI agents and Tools.
- IT504B.2:** Know various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction).
- IT504B.3:** Understand the fundamentals of knowledge representation (logic-based, frame-based, semantic nets), inference and theorem proving.
- IT504B.4:** Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information.
- IT504B.5:** Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems.

SUBJECT NAME : OPERATIONS RESEARCH
SUBJECT CODE : IT504C

Course Outcome:

After completion of this course students will be able to

- IT504C.1:** Design knowledge-base representation models.
- IT504C.2:** Analyze the performance of rule-based-systems.
- IT504C.3:** Develop rule-based expert systems and planning tools.
- IT504C.4:** Implement heuristic search algorithms for real life problem solving.

SUBJECT NAME : INDUSTRIAL & FINANCIAL MANAGEMENT
SUBJECT CODE : HU 505

Course Outcome

After completion of this course student will be able to

- HU505.1:** Explain and describe various technology-based business models and the dynamics of value creation, value proposition, and value capture in industrial enterprises.
- HU505.2:** Select, interpret and use different costing techniques as a basis for decisions in various business situations.
- HU505.3:** Understand the basic principles of financial accounting and reporting.
- HU505.4:** Produce and interpret an industrial company's Annual Statement, at a basic level.
- HU505.5:** Describe the operations of an industrial enterprise from various perspectives, and analyze its basic strengths and weaknesses based on concepts from the field of Industrial Management.
- HU505.6:** Explain how the industrial company markets and price its products considering GST

SUBJECT NAME : DESIGN ANALYSIS OF ALGORITHM LAB
SUBJECT CODE : IT591

Course Outcome

After completion of this course student will be able to

- IT591.1:** Analyze a problem and design the solution for the problem.
- IT591.2:** Optimize the solution with respect to time complexity & memory usage.
- IT591.3:** Apply different algorithmic approaches for solving the problems.
- IT591.4:** Analyze the efficiency of algorithms using time and space complexity theory.

SUBJECT NAME : SOFTWARE ENGINEERING LAB
SUBJECT CODE : IT592

Course Outcome:

After completion of this course student will be able to

- IT592.1:** Ability to analysis and design of complex systems and meet ethical standards, legal responsibilities
- IT592.2:** Ability to apply software engineering principles, techniques and develop, maintain, evaluate large-scale software systems.
- IT592.3:** To produce efficient, reliable, robust and cost-effective software solutions and perform independent research and analysis.

IT592.4: Ability to work as an effective member or leader of software engineering teams and manage time, processes and resources effectively by prioritizing competing demands to achieve personal and team goals.

SUBJECT NAME : OPERATING SYSTEM LAB
SUBJECT CODE : IT593

Course Outcome

After completion of this course student will be able to

- IT593.1:** Describe the important computer system resources and the role of operating system in their management policies and algorithms.
- IT593.2:** Understand the process management policies and scheduling of processes by CPU
- IT593.3:** Evaluate the requirement for process synchronization and coordination handled by operating system
- IT593.4:** Describe and analyze the memory management and its allocation policies
- IT593.5** Identify use and evaluate the storage management policies with respect to different storage management technologies.

SUBJECT NAME : PROGRAMMING PRACTICE WITH C++ LAB
SUBJECT CODE : IT 594A

Course Outcome

After completion of this course student will be able to

- IT594A.1:** understand the difference between object oriented programming and procedural oriented programming language.
- IT594A.2:** program using C++ features such as composition of objects, Operator overloading, inheritance, Polymorphism etc.
- IT594A.3:** construct appropriate diagrams and textual descriptions to communicate the static structure and dynamic behavior of an object oriented solution.
- IT594A.4:** simulate the problem in the subjects like Operating system, Computer networks and real world problems.

SUBJECT NAME : ARTIFICIAL INTELLIGENCE LAB
SUBJECT CODE : IT594B

Course Outcome:

After completion of this course student will be able to

- IT594B.1:** Understand the fundamentals of knowledge representation, inference and theorem proving using AI tools.
- IT594B.2:** Demonstrate working knowledge of reasoning in the presence of incomplete and/or uncertain information.
- IT594B.3:** Ability to apply knowledge representation, reasoning, and machine learning techniques to real-world problems.
- IT594B.4:** Apply various AI search algorithms (uninformed, informed, heuristic, constraint satisfaction,)

SUBJECT NAME : OPERATIONS RESEARCH LAB
SUBJECT CODE : IT594C

Course Outcome:

After completion of this course student will be able to

- IT594C.1:** Understand knowledge of different Optimization Techniques.
- IT594C.2:** Analyze for better Optimization Techniques
- IT594C.3:** Implement Dijkstra's or Floyd's Algorithm, Maximal Flow Problem, PERT/CPM using TORA

6TH SEMESTER

SUBJECT NAME : DATA BASE MANAGEMENT SYSTEM
SUBJECT CODE : IT 601

Course Outcome

After completion of this course student will be able to

- IT601.1:** Define Database Management System, explain fundamental elements of a database management system, compare the basic concepts of relational data model, entity-relationship model.
- IT601.2:** Design entity-relationship diagrams to represent simple database application scenarios, translate entity-relationship diagrams into relational tables, populate a relational database and formulate SQL queries on the data
- IT601.3:** Criticize a database design and improve the design by normalization
- IT601.4:** Choose efficient query optimization techniques, select suitable transaction management, concurrency control mechanism and Recovery management techniques.
- IT601.5:** Explain File organization and use appropriate index structure.

SUBJECT NAME : WEB TECHNOLOGY
SUBJECT CODE : IT602

Course Outcome: At the end of the course students will be able to

- IT602.1:** Understand and evaluate web application architecture, technologies and frameworks.
- IT602.2:** Apply the knowledge of web technology in developing web applications
- IT602.3:** Evaluate different solutions in field of web application development.
- IT602.4:** Implement small to large scale project to provide live solution in web application development fields

SUBJECT NAME : COMPUTER NETWORKING
SUBJECT CODE : IT 603

Course Outcome

After completion of this course student will be able to

- IT603.1:** Understand the network model and architecture
- IT603.2:** Analyze different networking functions and features for indentifying optimal solutions

IT603.3: Apply different networking concepts for implementing network solution

IT603.4: Evaluate and implement routing algorithms for implanting solution for the real life problems

IT603.5: Implement model of fault tolerant computer networks.

SUBJECT NAME : ERP
SUBJECT CODE : IT 604A

Course Outcome

After completion of this course student will be able to

IT604A.1: Understand the basic concepts and benefits of ERP

IT604A.2: Identify different technologies and IT support used in ERP.

IT604A.3: Understand and apply the concepts of ERP Manufacturing Perspective and ERP Modules.

IT604A.4: Understand and implement the ERP life cycle.

IT604A.5 Apply different tools used in ERP.

SUBJECT NAME : INFORMATION AND CODING THEORY
SUBJECT CODE : IT 604B

Course Outcome

After completion of this course student will be able to

IT604B.1: Understand the concepts of information, mutual information, entropy and various source coding techniques for a reliable digital communication.

IT604B.2: Analyze the need for source coding and error control techniques in a communication system.

IT604B.3: Apply linear algebra, concept of Galois field, conjugate roots, minimal polynomial in channel coding techniques for error control.

IT604B.4: Generate different error control codes like linear block codes, cyclic codes, BCH codes, and perform error detection and correction.

IT604B.5: Design the circuit for different error control coding techniques.

SUBJECT NAME : MICROPROCESSOR & MICROCONTROLLER
SUBJECT CODE : IT 604C

Course Outcome:

After completion of this course student will be able to

- IT604C.1:** Able to correlate the architecture, instructions, timing diagrams, addressing modes, memory interfacing, interrupts, data communication of 8085
- IT604C.2:** Recognize 8051 micro controller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o, interrupts
- IT604C.3:** Recognize 8051 micro controller hardware, input/output pins, ports, external memory, counters and timers, instruction set, addressing modes, serial data i/o, interrupts
- IT604C.4:** Apply instructions for assembly language programs of 8085, 8086 and 8051
- IT604C.5:** Design peripheral interfacing model using IC 8255, 8253, 8251 with IC 8085, 8086 and 8051.

SUBJECT NAME : DIGITAL IMAGE PROCESSING
SUBJECT CODE : IT604D

Course Outcome: After completion of this course students will be able to

- IT604D.1:** Understand the fundamental concepts of a digital image processing system.
- IT604D.2:** Analyze images in the spatial as well as frequency domain using various transforms.
- IT604D.3:** Categorize and implement various compression techniques.
- IT604D.4:** Implement and evaluate the techniques for improving the image quality.
- IT604D.5:** Analyze and implement image segmentation and representation techniques

SUBJECT NAME : DIGITAL SIGNAL PROCESSING
SUBJECT CODE : ECE(IT)605A

Course Outcome

After completion of this course student will be able to

- ECE(IT)605A.1:** Able to understand the classification and operations of discrete signals.
- ECE(IT)605A.2:** Able to interpret discrete time systems.
- ECE(IT)605A.3:** Able to analyze discrete time signal in frequency domain and their region of convergence using Z Transforms.
- ECE(IT)605A.4:** Able to define discrete systems in the Frequency domain using Fourier analysis tools like DFT, FFT.
- ECE(IT)605A.5:** Able to design FIR and IIR digital filters.

SUBJECT NAME : COMPILER DESIGN
SUBJECT CODE : IT 605B

Course Outcome

After completion of this course student will be able to

IT605B.1: To understand the knowledge of parsing, lexical and syntax analysis.

IT605B.2: To analyze various parsing techniques, code optimization.

IT605B.3: To apply the knowledge about the compilers they practically use.

IT605B.4: To learn how the parse trees are generated, errors are handled and code is optimized.

SUBJECT NAME : GREEN COMPUTING

SUBJECT CODE : IT 605C

Course Outcome

After completion of this course student will be able to

IT605C.1: Understand and analyze Green IT.

IT605C.2: Compare and invent new methodology for green assets like Data Centers.

IT605C.3: Gain knowledge about Grid framework.

IT605C.4: Understand the Protocols, Standards, and Audits of Green Compliance.

IT605C.5: Apply the concept of the Environmentally Responsible Business Strategies.

SUBJECT NAME : SOFT COMPUTING

SUBJECT CODE : IT605D

Course Outcome

After completion of this course student will be able to

IT605D.1: Understand importance of soft computing.

IT605D.2: Understand different soft computing techniques like Genetic Algorithms, Fuzzy Logic, Neural Networks and their combination.

IT605D.3: Implement algorithms based on soft computing.

IT605D.4: Apply soft computing techniques to solve engineering or real life problems.

SUBJECT NAME : PROJECT MANAGEMENT

SUBJECT CODE : IT605E

Course Outcome

After completion of this course student will be able to

IT605E.1 Describe the basic concepts of software project management and project planning

IT605E.2 Apply project management techniques to real-world project

IT605E.3 Apply different techniques in monitoring and control of project and people.

IT605E.4 Work in team to understand and evaluate project management standard, tools, managing contracts and software quality.

SUBJECT NAME : HUMAN RESOURCE MANAGEMENT
SUBJECT CODE : IT605F

Course Outcome

After completion of this course student will be able to

- IT605F.1** Explain the importance of human resources and their effective management in organizations
- IT605F.2** Describe the meanings of terminology and tools used in managing employees Effectively and Record governmental regulations affecting employees and Employers
- IT605F.3** Demonstrate a basic understanding of different tools used in forecasting, planning and maintenance of human resource needs
- IT605F.4** Analyze the key issues related to administering the human elements such as Motivation, compensation, appraisal, career planning, diversity, ethics, and training

SUBJECT NAME : DATA BASE MANAGEMENT SYSTEM LAB
SUBJECT CODE : IT691

Course Outcome:

After completion of this course student will be able to

- IT691.1:** Design and implement a database schema for a given problem-domain
- IT691.2:** Create and maintain tables using PL/SQL Course Outcome
- IT691.3:** Populate and query a database
- IT691.4:** Prepare reports
- IT691.5:** Application development using PL/SQL & front end tools

SUBJECT NAME : WEB TECHNOLOGY LAB
SUBJECT CODE : IT692

Course Outcome: At the end of the course students will be able to

- IT692.1:** understand and evaluate web application architecture, technologies and frameworks.
- IT692.2:** Apply the knowledge of web technology in developing web applications
- IT692.3:** Evaluate different solutions in field of web application development.
- IT692.4:** Implement small to large scale project to provide live solution in web application development fields

SUBJECT NAME : Computer Networking Lab
SUBJECT CODE : IT 693

Course Outcome

After completion of this course student will be able to

IT693.1: Understand and apply different network commands.

IT693.2: Analyze different networking functions and features for implementing optimal solutions.

IT693.3: Apply different networking concepts for implementing network solution.

IT693.4: Implement different network protocols.

SUBJECT NAME : SYSTEM ENGINEERING LAB
SUBJECT CODE : IT 694

Course Outcome

After completion of this course student will be able to

IT694.1: Understand and analyze the embedded systems

IT694.2: Understand and apply the embedded programming concepts

IT694.3: Analyze and evaluate solution in physical computing fields

IT694.4: Implement simple to critical circuit using embedded system.

7TH SEMESTER

SUBJECT NAME : E-COMMERCE
SUBJECT CODE : IT 701

Course Outcome

After completion of this course student will be able to

- IT701.1** Understand the policy issues related to privacy, intellectual property rights, and establishing identity those are germane to electronic commerce along with the Internet and related technologies.
- IT701.2** Comprehend the underlying economic mechanisms and driving forces of E-Commerce;
- IT701.3** Analyze the impact that electronic commerce is facing and outlines the different digital transaction process and basic concepts of e-commerce.
- IT701.4** Identify the importance of digital library and specify the development of electronic commerce capabilities in a company.
- IT701.5** Appraise the opportunities and potential to apply and synthesize a variety of e-Commerce and M-Commerce concepts and solutions to create business value for organizations, customers, and business partners.

SUBJECT NAME : COMPUTER GRAPHICS AND MULTIMEDIA
SUBJECT CODE : IT702A

Course Outcome

After completion of this course student will be able to

- IT702A.1:** Know the foundations of computer graphics and Identify different media representations of different multimedia data and data formats.
- IT702A.2:** Comprehend the concept of geometric, mathematical and algorithmic concepts necessary for programming computer graphics.
- IT702A.3:** Understand the comprehension of windows, clipping and view-ports object representation in relation to images displayed on screen.
- IT702A.4:** Apply different coding technique for solving real world problems.
- IT702A.5:** Identify the software utilized in constructing computer graphics and multimedia applications.

SUBJECT NAME : PATTERN RECOGNITION
SUBJECT CODE : IT 702B

Course Outcome

After completion of this course student will be able to

- IT702B.1:** Understand basic concepts in pattern recognition.
- IT702B.2:** Formulate and describe various applications in pattern recognition.
- IT702B.3:** Gain knowledge about state-of-the-art algorithms used in pattern recognition research.
- IT702B.4:** Understand pattern recognition theories, such as Bayes classifier, linear discriminant analysis.
- IT702B.5:** Demonstrate successful applications to process and analyze images, and to make automatic decisions based on extracted feature information.

SUBJECT NAME : INTERNET TECHNOLOGY
SUBJECT CODE : IT 702C

Course Outcome

After completion of this course student will be able to

- IT702C.1:** Understand advanced networking concepts and internet and web application architectures
- IT702C.2:** Analyze and understand different advanced routing protocols being used in web application development
- IT702C.3:** Analyze and evaluate different solution available in the field of networking and web application development such as http and the World Wide Web, HTML, and Java Scripts;
- IT702C.4:** Implement solution for different critical network related issues as; implementing the design using the client/server model, testing and documenting the solutions developed.

SUBJECT NAME : CLOUD COMPUTING
SUBJECT CODE : IT 703A

Course Outcome

After completion of this course student will be able to

- IT703A.1:** Understand the basic architecture of cloud computing
- IT703A.2:** Analyze different problems in the domain of cloud computing.
- IT703A.3:** Apply the knowledge of cloud computing in the evaluation of the computing model.

IT703A.4: Evaluate the different models and solutions provided in the field of cloud computing.

SUBJECT NAME : DISTRIBUTED SYSTEM
SUBJECT CODE : IT 703B

Course Outcome

After completion of this course student will be able to

- IT703B.1:** Understand the knowledge of the basic elements and concepts related to distributed system technologies for identify core architectural aspects of distributed systems;
- IT703B.2:** Design and implement distributed applications;
- IT703B.3:** Identify the main underlying components of distributed systems (such as RPC, file systems) and use those components for building a distributed system
- IT703B.4:** Use and apply important methods in distributed systems to support scalability and fault tolerance;
- IT703B.5:** Demonstrate experience in building large-scale distributed applications.

SUBJECT NAME : DATA WAREHOUSING AND DATA MINING
SUBJECT CODE : IT703C

Course Outcome

After completion of this course student will be able to

- IT703C.1:** Understand the concepts of data warehousing and data mining
- IT703C.2:** Understand and apply the dimensional modeling technique for designing a data warehouse applying warehouse architectures
- IT703C.3:** Apply OLAP and the project planning aspects in building a data warehouse and. explain the knowledge discovery process
- IT703C.4:** Identify and apply the data mining tasks and study their well-known techniques
- IT703C.5:** Develop an understanding of the role played by knowledge in a diverse range of intelligent systems

SUBJECT NAME : MODELLING AND SIMULATION
SUBJECT CODE : IT704A

Course Outcome

After completion of this course student will be able to

- IT704A.1:** Summarize the issues in Modeling and Simulation
- IT704A.2:** Explain the System Dynamics & Probability concepts in Simulation.
- IT704A.3:** Solve the Simulation of Queuing Systems
- IT704A.4:** Analyze the Simulation output

IT704A.5: Identify the application area of Modeling and Simulation and apply in the corresponding fields

SUBJECT NAME : CONTROL SYSTEM
SUBJECT CODE : EE(IT)704B

Course Outcome

After completion of this course student will be able to

- EE(IT)704B.1:** Understand and explain basic structure of control systems, basic terminologies, components.
- EE(IT)704B.2:** Represent physical systems into transfer function form and thus can analyze system dynamic and steady state behavior.
- EE(IT)704B.3:** Analyze system stability and design controllers, compensators in frequency domain.

SUBJECT NAME : MICROELECTRONICS AND VLSI DESIGN
SUBJECT CODE : ECE(IT)704C

Course Outcome

After completion of this course student will be able to

- ECE(IT)704C.1:** Use mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnect
- ECE(IT)704C.2:** Create models of moderately sized CMOS circuits that realize specified digital functions
- ECE(IT)704C.3:** Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality, timing, power, and parasitic effects
- ECE(IT)704C.4:** Understand of the characteristics of CMOS circuit construction and the comparison between different state-of-the-art CMOS technologies and processes
- ECE(IT)704C.5:** Complete a significant VLSI design project having a set of objective criteria and design constraints

SUBJECT NAME : MOBILE COMMUNICATION
SUBJECT CODE : IT704D

Course Outcome

After completion of this course student will be able to

- IT704D.1:** Explain the limitations of fixed networks; the need and the trend toward mobility; the concepts portability and mobility.
- IT704D.2:** Describe and analyze the network infrastructure requirements to support mobile devices and users.

- IT704D.3:** Illustrate the concepts, techniques, protocols and architecture employed in wireless local area networks, cellular networks, and perform basic requirements analysis.
- IT704D.4:** Apply techniques and technologies to design and communicate a simple mobile application for smaller devices.

SUBJECT NAME : E-COMMERCE LAB
SUBJECT CODE : IT 791

Course Outcome

After completion of this course student will be able to

- IT791.1:** Understand the concept of PHP framework.
- IT791.2:** Analyzing different client and server side components for developing application and build dynamic web site using server side PHP programming and database connectivity
- IT791.3:** Apply and concept for developing MVC application and describe and differentiate different Web Extensions and Web Services.
- IT791.4:** Apply and implement the solution to real life problem using PHP concepts and Demonstrate web application using Python web Framework.

SUBJECT NAME : COMPUTER GRAPHICS AND MULTIMEDIA LAB
SUBJECT CODE : IT792A

Course Outcome

After completion of this course student will be able to

- IT792A.1:** Create 3D graphical scenes using open graphics library suits
- IT792A.2:** Analyze the effects of scale and use on both presentation and lower level requirements
- IT792A.3:** Develop an interactive multimedia presentation by using multimedia devices and identify theoretical and practical aspects in designing multimedia applications surrounding the emergence of multimedia technology.
- IT792A.4:** Implement image manipulation, enhancement, and basic transformations on objects and clipping algorithm on lines

SUBJECT NAME : PATTERN RECOGNITION LAB
SUBJECT CODE : IT 792B

Course Outcome

After completion of this course student will be able to

- IT792B.1:** Understand pattern recognition concepts.
- IT792B.2:** Analyze pattern recognition techniques.
- IT792B.3:** Apply different pattern recognition technique for providing solution.
- IT792B.4:** Implement solution to real life problem using pattern recognition techniques.

SUBJECT NAME : INTERNET TECHNOLOGY LAB
SUBJECT CODE : IT792C

Course Outcome

After completion of this course student will be able to

IT792C.1: Understanding and apply the basic networking concepts for configuration of network server and routing protocols.

IT792C.2: Analyzing and understanding the concept of .NET framework

IT792C.3: Apply the concept of .NET for implementing web applications

IT792C.4: Evaluate different web application to implement optimal solutions for real life problems.

8TH SEMESTER

SUBJECT NAME : ADVANCED COMPUTER ARCHITECTURE
SUBJECT CODE : IT801A

Course Outcome:

After completion of this course student will be able to

- IT801A.1:** Understand the operations of modern and high performance computer systems.
- IT801A.2:** Identify cache and memory related issues in multi-processors architecture.
- IT801A.3:** Evaluate performance of different architectures with respect to various parameters.
- IT801A.4:** Analyze performance of different ILP techniques of computer architecture.
- IT801A.5:** Design the mechanism by which the performance of the system is enhanced.

SUBJECT NAME : CRYPTOGRAPHY AND NETWORK SECURITY
SUBJECT CODE : IT801B

Course Outcome:

After completion of this course student will be able to

- IT801B.1:** Identify computer and network security threats, classify the threats and develop a security model to prevent, detect and recover from the attacks.
- IT801B.2:** Analyze existing authentication and key agreement protocols, identify the weaknesses of these protocols.
- IT801B.3:** Develop SSL or Firewall based solutions against security threats, employ access control techniques to the existing computer platforms.
- IT801B.4:** Write an extensive analysis report on any existing security product or code, investigate the strong and weak points of the product or code.

SUBJECT NAME : NATURAL LANGUAGE PROCESSING
SUBJECT CODE : IT801C

Course Outcome:

After completion of this course student will be able to

- IT801C.1:** Understand the models, methods, and algorithms of statistical Natural Language Processing (NLP) for common NLP tasks.
- IT801C.2:** Apply core computer science concepts and algorithms in the processing of natural language.

IT801C.3: Apply the methods to new NLP problems and will be able to apply the methods to problems outside NLP.

IT801C.4: Familiar with research field and able to implement a system which processes a natural language

SUBJECT NAME : BIO-INFORMATICS

SUBJECT CODE : IT801D

Course Outcome:

After completion of this course student will be able to

IT801D.1: Acquire the knowledge of Bioinformatics technologies with the related concept of DNA, RNA and their implications

IT801D.2: Understand the concept and techniques of different types of Data Organization and Sequence Databases with different types of Analysis Tools for Sequence Data Banks

IT801D.3: Acquire the knowledge of the DNA Sequence Analysis

IT801D.4: Analyze the performance of different types of Probabilistic models used in Computational Biology

SUBJECT NAME : BUSINESS ANALYTICS

SUBJECT CODE : IT802A

Course Outcome:

After completion of this course student will be able to

IT802A.1: Find a meaningful pattern in data

IT802A.2: Graphically interpret data

IT802A.3: Implement the analytic techniques

IT802A.4: Handle large scale analytics projects from various domains

SUBJECT NAME : CYBER LAW AND SECURITY POLICY

SUBJECT CODE : IT802B

Course Outcome:

After completion of this course student will be able to

IT802B.1: Understand the policy issues related to electronic filing of documents with the Government agencies and further to amend the Indian Penal Code, the Indian Evidence Act, 1872, the Bankers' Books Evidence Act, 1891 and the Reserve Bank of India Act, 1934 and for matters connected therewith or incidental thereto.

IT802B.2: Analyze the effectiveness of the prevailing information security law practices.

IT802B.3: Identify the importance of lawful recognition for transactions through electronic data interchange and other means of electronic communication, commonly referred to as electronic commerce or E-Commerce.

IT802B.4: Comprehend the architecture that can cater to the needs of the social information

security.

SUBJECT NAME : ADVANCED DBMS
SUBJECT CODE : IT 802C

Course Outcome

After completion of this course student will be able to

IT802C.1: Evaluate and Apply Advanced Database Development Techniques.

IT802C.2: Evaluate different Database Systems

IT802C.3: Perform administrator's job for database systems.

IT802C.4: Design & Implement Advanced Database Systems

SUBJECT NAME : INTERNET OF THINGS
SUBJECT CODE : IT802D

Course Outcome

After completion of this course student will be able to

IT802D.1: Understand the basic concepts of Internet of Things and its architecture.

IT802D.2: Analyze and understand the basic applications of IoT.

IT802D.3: Evaluate and analyze different solution for the real life problems of Internet of Things.

IT802D.4: Apply the concepts of IoT to design different tools.

SUBJECT NAME : VALUES AND ETHICS IN PROFESSIONS
SUBJECT CODE : HU802

Course Outcome:

After completion of this course student will be able to

HU802.1: Understand the core values that shape the ethical behaviour of an engineer and Exposed awareness on professional ethics and human values.

HU802.2: Understand the basic perception of profession, professional ethics, various moral issues & uses of ethical theories

HU802.3: Understand various social issues, industrial standards, code of ethics and role of professional ethics in engineering field

HU802.4: Aware of responsibilities of an engineer for safety and risk benefit analysis, professional rights and responsibilities of an engineer.

HU802.5: Acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives



JIS College of Engineering
Department of Mechanical Engineering



List of PROGRAM OUTCOMES

Mechanical Engineering Graduates will be able to achieve the following outcomes:

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science and the fundamentals of mechanical engineering to the solution of real life engineering problems.
PO 2	Problem analysis: Identify, formulate and analyze complicated engineering problems using mathematics & engineering sciences and review concerned literatures to reach substantiated conclusions
PO 3	Design/development of solutions: Design an optimized solution for complex mechanical engineering problems and formulate system components or processes for the public health and safety.
PO 4	Conduct investigations of complex problems: Use research-based knowledge for designing critical experiments, methods of analysis and interpretation of data to synthesize a valid solution of mechanical engineering problems.
PO 5	Modern tool usage: Learn modern CAD CAM software for modeling and prediction of detailed engineering phenomena and assess the appropriate results.
PO 6	The engineer and society: Apply reasoning induced by the contextual knowledge to assess societal, health, safety and cultural issues while maintaining consequent responsibilities of a Mechanical Engineering professional.
PO 7	Environment and sustainability: Understand the impact of mechanical engineering activities in environmental contexts and demonstrate the knowledge for sustainable development of the society.
PO 8	Ethics: Learn and commit to professional ethics and responsibilities by practicing consequent norms in various mechanical engineering practice
PO 9	Individual and team work: Function effectively as individual, as a member or a leader in diverse teams and multidisciplinary settings.
PO 10	Communication: Communicate effectively about technical issues with the engineering community and with society at large, comprehend and design effective documentation, make effective presentations and give or receive clear instructions.



PO 11	Project management and finance: Demonstrate knowledge and understanding of core engineering and management principles to manage projects in multidisciplinary environments as an individual, a member or leader of a team.
PO 12	Life-long learning: Recognize the need for life-long learning in the broadest context of technological change and have the ability to engage independently.

List of PEOGRAM SPECIFIC OUTCOMES (PSOs)

PSO 1	Graduates will be able to apply necessary mathematical and advanced software tools for design, analysis, and fabrication of components used in the field of mechanical engineering.
PSO 2	Students will be able to gain knowledge about advanced engines, machines, modern thermo-fluid systems and develop critical skills to analyze the cause and effect of complicated mechanical processes.
PSO 3	Graduates will gain team spirit for working in a variety of manufacturing industries, HVAC, Aviation, Automobile & Power Sectors as well as pursuing higher studies for contribution to research and development.



Mapping of course outcome and program outcome of all subjects for the entire curriculum as per Regulation 2016 implemented from Academic year 2016-17 is shown below:

First Year First Semester Curriculum

A. THEORY							
Sl No	Course Code	Theory	Contact Hours /Week				Credit Points
			L	T	P	Total	
1	M 101	Mathematics -I	3	1	0	4	4
2	PH 101	Physics - I(Gr. B)	3	1	0	4	4
3	EC 101	Basic Electronics Engineering (Gr. B)	3	1	0	4	4
4	HU 101	Professional Communication	2	0	0	2	2
5	ME 101	Engineering Mechanics	3	1	0	4	4
Total of Theory			14	4	0	18	18
B. PRACTICAL							
6	HU191	Lang. Lab. and Seminar Presentation	0	0	2	2	1
7	PH191	Physics -I Lab(Gr. B)	0	0	3	3	2
8	EC 191	Basic Electronics Engineering Lab(Gr. B)	0	0	3	3	2
9	ME 191	Workshop Practice (Gr-B)	0	0	3	3	2
Total of Practical			0	0	11	11	07
C. Sessional							
10	XC181.	Extra Curricular Activity (NSS/ NCC)	0	0	2	2	1
Total of Semester			14	4	13	31	26

First Semester Theory

Course Name: Mathematics -I

Course Code: M101

Contact: 4L

Credit: 4

Prerequisite: Higher Secondary level knowledge in Mathematics

Course Outcomes:



On successful completion of the learning sessions of the course, the learner will be able to:

CODE	DESCRIPTION
M 101.1	Recall the distinctive characteristics of Matrix Algebra, Calculus of Single and Several Variables and Vector Analysis to analyze the problems in Science & Technology. (Remembering)
M 101.2	Demonstrate the theoretical concept of Matrix Algebra, Calculus of Single and Several Variables, and Vector Analysis and understand the related working principles to solve the problems in Science & Technology. (Understanding)
M 101.3	Develop mathematical model of various real world scenarios using concepts of Matrix algebra, Calculus of Single and Several Variables, and Vector Analysis and solve the same, judge if the results are reasonable, and then interpret and clearly communicate the results. (Applying)

Course Articulation Matrix:

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
M101.1	3	2	-	-	-	-	-	-	-	-	-	1	1	-	-
M101.2	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
M101.3	3	2	2	-	-	-	-	-	-	-	-	1	3	-	-
Avg.	3	2	2	-	-	-	-	-	-	-	-	1	2	-	-

Course Name: Physics -I

Course Code: PH 101/ PH201

Contact: 4

Credit: 4

Prerequisites: Knowledge of Physics up to 12th standard.

Course Objective:

The aim of courses in Physics is to provide an adequate exposure and develop insight about the basic physics principles along with the possible applications. The acquaintance of basic principles of physics would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. It can also create awareness of the vital role played by science and engineering in the development of new technologies. It also gives necessary exposure to the practical aspects, which is an essential component for learning sciences.

Course Outcomes: At the end of the course students' should be able to

PH 101.1 : define ➤ De-Broglie hypothesis, and Heisenberg's Uncertainty Principle ➤ Amplitude and Velocity Resonance ➤ Malus's Law, Brewster's Law ➤ Characteristics of LASER light	PO1
PH 101.2 : explain ➤ Polarizer and analyzer ➤ basic principles and different types of LASER and Optical Fibre ➤ structure of solids, Miller indices ➤ theory of Matter Wave, equation of motion of Matter Wave ➤ wave function and its role in representing wave nature of matter	PO1



PH 101.3 : apply the knowledge of ➤ mechanical vibration in electrical circuits ➤ superposition principle in Newton's ring phenomenon, diffraction phenomenon ➤ quantum nature of e.m. waves for production of laser ➤ total internal reflection in transmitting light through optical fibres ➤ x-ray diffraction in crystal structure ➤ probability interpretation in Heisenberg's uncertainty principle	PO1
PH 101.4 : analyze ➤ grating as many slit system ➤ role of Q factor in a resonating circuit, conditions of different types of resonance ➤ minimum requirements for lasing action ➤ importance of light as a carrier of information ➤ the failures of classical physics in microscopic situation and need of quantum physics ➤ Einstein's A, B coefficient and predict the wavelength domain of Lasing action ➤ Requirement of Miller indices for describing crystallographic planes	PO2
PH 101.5 : judge ➤ X-ray production process is inverse of the process of Photoelectric Effect. ➤ different crystallographic structures according to their Co-ordination number and packing factors ➤ the outcome of Photo-electric effect, Compton effect and Davission-Germer experiment to justify wave-particle duality of matter	PO3

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
PH 101.1	3	-	-	-	-	-	-	-	-	-	-	2	-	-	-
PH 101.2	3	-	-	-	-	-	-	-	-	-	-	2	-	1	-
PH 101.3	2	3	-	-	-	-	-	-	-	-	-	1	-	1	-
PH 101.4	2	3	-	-	-	-	-	-	-	-	-	1	-	-	-
PH 101.5	1	3	-	-	-	-	-	-	-	-	-	1	-	1	-
Avg	2.2	3	-	-	-	-	-	-	-	-	-	1.4	-	1	-

Course Name: Engineering Mechanics

Course Code: ME101

Contacts: 4L

Credit: 4

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics.

Course Objective:

To develop the concept of force, equilibrium, moment and their interrelationships when applied to bodies at static and dynamic conditions.

Course Outcome:

Upon successful completion of the course, student should be able to:

1. Demonstrate free body diagram and calculate the reactions necessary to ensure static equilibrium.
2. Analyze the effect of friction in static and dynamic conditions.
3. Relate the different surface properties, property of masses and material properties.
4. Solve different problems of kinematics and kinetics.



CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
ME101.1	3	3	2	2	-	-	-	-	1	-	-	-	1	1	1
ME101.2	3	3	2	2	-	-	-	-	1	-	-	1	2	1	3
ME101.3	3	2	3	2	1	-	-	-	1	-	-	1	2	1	1
ME101.4	3	3	3	3	-	-	-	-	1	-	1	-	1	3	2
Avg.	3	2.7 5	2.5	2.2 5	1	-	-	-	1	-	1	1	1.5	1.5	1.75

Course Name: Basic Electronics Engineering

Course code: EC101/EC201

Contacts: 4L

Credit: 4

Prerequisite: Electric current and voltage-D.C and A.C., Complex impedance, conductivity, resistivity, transformer, charging and discharging of capacitor, active and passive elements.

Course Objective: To understand and apply the knowledge of Basic Electronics in analyzing and solving problems of Mechanical Engineering

Course Outcomes: At the end of the course students' should be able to

CO.EC101.1	Demonstrate the concept of Conductors, Insulators, and Semiconductors based on energy-band theory and analyze relevant problems
CO.EC101.2	Explain the working principles of P-N Junction Diode, zener diode and analyze their applications in the rectifier, clipper, clamper, regulator etc.
CO.EC101.3	Analyze characteristics of Bipolar junction transistor(BJT) under CE, CE, CC mode of operation and its biasing therein
CO.EC101.4	Distinguish the operations of JFET, MOSFET and demonstrate their operations under CG, CS, CD configurations
CO.EC101.5	Determine parameters in Operational Amplifier circuit design for various applications

Course Articulation Matrix:

CO Codes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.EC101.1	3	3	2	-	1	-	3		2	2	-	3	-	-	2
CO.EC101.2	3	3	2	-	1	2		2	-	-	3	3	-	-	2
CO.EC101.3	3	3	3	1	-	3	2		-	-	2	3	-	2	2
CO.EC101.4	3	3	3	-	2	-	-	1		1	-	3	-	2	-
CO.EC101.5	3	3	-	2		2		1	-	-	-	3	-	-	-
Avg	3	3	2.5	1.5	1.3	2.3	2.5	1.3	2	1.5	2.5	3	-	2	2

Course Name: Professional Communication

Course Code: HU101

Contacts: 2L



Credit: 2

Prerequisite: Basic knowledge of high school English.

Course Objective: Designed to meet the basic survival needs of communication in the globalized workplace, including knowledge of and competency in the use of macroskills in reading and writing proficiency, functional grammar and usage.

Course Outcome:

On successful completion of the learning sessions of the course, the learner will be able to:

HU101.1:	Able to comprehend and communicate in English through exposure to communication skills theory and practice.
HU101.2:	Apply the basic grammatical skills of the English language through intensive practice.
HU101.3:	Able to develop reading and comprehension skills.
HU101.4:	Able to develop writing proficiency skills by writing Official Letters, Technical report, memo, notice, minutes, agenda, resume, curriculum vitae.
HU101.5:	Able to apply all sets of English language and communication skills in creative and effective ways in the professional sphere of their life

First Semester Practical Courses

Course Name: Language Lab. and Seminar Presentation

Course Code: HU191

Contacts: 2

Credit: 1

Course Outcomes:

1. To impart basic skills of communication in English through intensive practice to the first year UG students of Engineering so as to enable them to function confidently and effectively in English language in the professional sphere of their life.
2. To make the students practice the basic grammar of the English language.
3. To improve the reading and writing skills of the students.
4. To develop proficiency in written communication.

CO-PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
HU191.1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
HU191.2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
HU191.3	-	-	-	-	-	-	1	-	-	-	-	-	-	-	3
HU191.4	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
Avg	-	-	-	-	-	3	1	-	-	3	-	-	-	-	3

Physics-1 Lab

Course Code: PH191/291

Contacts: 3P

Credits: 2



Pre requisites: Knowledge of Physics upto 12th standard.

Course Outcomes: At the end of the course students' will be able to

PH 191.1 : demonstrate ✓ Error estimation, Proportional error calculation ✓ superposition principle in Newton's ring, Fresnel's biprism, laser diffraction ✓ Basic circuit analysis in LCR circuits	PO1
PH 191.2 : conduct experiments using ➤ LASER, Optical fibre ➤ Interference by division of wave front, division of amplitude, diffraction grating, polarization of light ➤ Quantization of electronic energy inside an atom ➤ Torsional pendulum	PO4
PH 191.3 : participate as an individual, and as a member or leader in groups in laboratory sessions actively	PO9
PH 191.4 : analyze experimental data from graphical representations , and to communicate effectively them in Laboratory reports including innovative experiments	PO10

CO-PO Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
PH 191.1	3	2	-	-	-	-	-	-	-	-	-	1
PH 191.2	1	2	-	3	-	-	-	-	-	-	-	1
PH 191.3	1	2	-	-	-	-	-	-	3	-	-	1
PH 191.4	1	2	-	-	-	-	-	-	-	3	-	1
Avg.	1.5	2	-	3	-	-	-	-	3	3	-	1

Course Name: Basic Electronics Engineering Lab

Course Code: EC191

Contacts: 3P/Week

Credit: 2

Perquisite: A basic course in electronics and Communication engineering Progresses from the fundamentals of electricity, active and passive components, basic electronics laws like Ohm's law, Ampere's law.

Course Objective: Students will become familiar with the circuit design using semiconductor diodes in Forward and Reverse bias; able to design rectifiers like half wave, full wave rectifiers etc. using diodes. The ability of circuit design with Bipolar Junction Transistor in CB, CE & CC configurations will be improved; will acquire the basic engineering technique and ability to design and analyze the circuits of OpAmp. Basic concepts and Circuit design with logic gates will be developed in the students. The students will be able design circuit using FET.

Course Outcome: After completion of this course student will be able to

- EC191.1:** Identify different types of passive and active electronic components, apply signals through signal generators and measure signals using CRO, Multimeter etc
- EC191.2:** Demonstrate and analyze the characteristics for PN junction diode, Zener diode.
- EC191.3:** Describe the regulator circuit and analyze the parametric observation
- EC191.4:** Demonstrate and analyze the characteristics for BJT, FET.
- EC191.5:** Explain the limits on observation of various parameters of OP-AMP.

CO-PO Mapping



	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
EC191.1	3	3	2	-	1	-	3	-	2	-	-	3	-	1	-
EC191.2	3	3	2	-	1	2	-	2	-	-	-	3	-	1	1
EC191.3	3	3	-	1		3	2		-	3	-	3	2	1	1
EC191.4	3	3	3	-	2	-	-	1	-		-	3	-	1	-
EC191.5	3	3	-	2	-	2	-	1	-	2	-	3	-	-	1
Avg	3	3	3	1.5	1.3	2.3	2.5	1.3	2	2.5	-	3	2	1	1

Course Name: Workshop Practice

Course Code: ME192

Contacts: 3P/Week

Credit: 2

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics

Course Objective: To get a hands on knowledge of several Workshop Practices like carpentry, fitting, welding, machining etc and learn safety regulations to be maintained in a shop floor.

Course Outcome: Upon successful completion of this course, the student will be able to:

1. Demonstrate basic knowledge of Workshop Practice and Safety useful for our daily living.
2. Identify Instruments of a pattern shop like Hand Saw, Jack Plain, Chisels etc and performing operations like such as Marking, Cutting etc used in manufacturing processes.
3. Make use of various operations in the Fitting Shop using Hack Saw, various files, Scriber, etc to understand the concept of tolerances applicable in all kind of manufacturing.
4. Get hands on practice of Welding and various machining processes which give a lot of confidence to manufacture physical prototypes in project works.

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME 192.1	2	-	-	-	-	2	-	1	-	-	1	-	-	1	-
ME 192.2	2	-	-	-	-	1	-	2	-	-	-	-	-	1	2
ME 192.3	2	-	-	-	-	1	-	1	-	-	-	-	-	1	2
ME 192.4	1	-	-	-	1	3	-	3	-	-	-	1	1	2	2
Average	1.75	-	-	-	1	1.75	-	1.75	-	-	1	1	1	1.25	2

Course Name: Extra Curricular Activity (NSS/ NCC)

Course Code: HU181

Contacts: 2

Credit: 1



First Year Second Semester

A. THEORY							
Sl No	Course Code	Theory	Contact Hours /Week				Credit Points
			L	T	P	Total	
1	M 201	Mathematics -II	3	1	0	4	4
2	CH 201	Chemistry	3	1	0	4	4
3	EE 201	Basic Electrical Engineering	3	1	0	4	4
4	CS 201	Computer Fundamentals & Principle of Computer Programming	3	1	0	4	4
5	ME 201	Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
Total of Theory			15	5	0	20	20
B. PRACTICAL							
6	CS291	Computer Fundamentals & Principle of Computer Programming Lab	0	0	3	3	2
7	CH 291	Chemistry Lab (Gr. B)	0	0	3	3	2
8	EE 291	Basic Electrical Engineering Lab (Gr. B)	0	0	3	3	2
9	ME 291	Engg Drawing & Graphics(Gr B)	0	0	3	3	2
Total of Practical			0	0	12	12	08
C. SESSIONAL							
10	MC 281	Soft Skill Development	0	0	2	2	0
Total of Semester			0	0	14	34	28



Second Semester Theory

Course Name: Mathematics-II

Course Code: M 201

Contact: 3L+1T

Credits: 4

Prerequisite: Knowledge of Physics, Chemistry & Mathematics in 10+2 standards

Course Objective: To understand the basic relationship of heat and work transfer for developing the primary concept of an engine.

Course Outcome: After completion of this course student will be able to

ME201.1: Know about thermodynamic equilibrium, heat & work transfer, First law and its application.

ME201.2: Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.

ME201.3: Know the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)

ME201.4: Knowledge of basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations.

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME201.1	3	3	2	2		1	1	1	1		1	2	1		1
ME201.2	3	3	2	2		1	2		1		1	2			
ME201.3	2	2	1	1		2	1					1		2	
ME201.4	3	3	2	2		1	1				1	1	2	2	2
Avg.	2.7	2.7	2.3	2.3									1.5	2	1.5

Course Name: Chemistry

Course Code: CH201

Contact: 4

Credit: 4

Pre requisites: Knowledge of Chemistry up to 12th standard.

Course Objective:

The aim of this course is to provide an adequate exposure and develop insight about the basic principles of chemistry along with the possible applications. This knowledge will help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches. It can also create awareness of the vital role played by science and engineering in the development of new technologies. It also gives necessary exposure to the practical aspects, which is an essential component for learning sciences

Course Outcomes: Upon successful completion of this course, the student will be able to

CO1: ability to define, understand and explain

- The concept of thermodynamic system, properties, processes and different parameters like enthalpy and entropy.
- Rate, Order, Molecularity of a reaction.



➤ Different types of crystal defect, intrinsic & extrinsic semiconductor, Photovoltaic cell ➤ Different types of conductance, Electrodes, Electrochemical Cell, EMF ➤ Corrosion, Cause of Corrosion, Effects of Corrosion, Passivation, Galvanic Series. ➤ Different types of Polymer, Its synthesis, Application ➤ Different types of nanomaterials, synthesis and application ➤ Different types of solid, liquid and gaseous fuel; calorific value (GCV & NCV), Octane no. & Cetane no. ➤ The concept of Electronegativity, electropositivity, electron affinity and ionization enthalpy ➤ Water quality parameters, hardness and types of hardness.
CO2: ability to apply the knowledge of ➤ Laws of thermodynamics, relation between different thermodynamic parameters like C_p and C_v, Hess's law and Law of Lavoisier and Laplace ➤ Rate of a reaction to derive kinetics of Zero, 1st and 2nd order reaction, Arrhenius Equation. ➤ Band theory for metal, insulator, semiconductor; electronic property changes of semiconductor due to doping. ➤ Poly Dispersity Index(PDI), Average molecular weight, Glass transition and melting temperature of polymer. ➤ Storage cell, Fuel cell, Commercial Battery. ➤ Chemical and Electrochemical Corrosion to identify the types of corrosion. ➤ Property changes in the nano dimension ➤ Knocking characteristics vs efficiency of the internal combustion engine ➤ Different organic reactions like addition elimination and substitution.
CO3: Ability to analyse the problem by ➤ the knowledge of thermodynamic parameters and functions ➤ the knowledge of order, Molecularity and kinetics of reactions. ➤ Effect of concentration on conductance, Nernst Equation, working principle of Electrochemical cell, ➤ Identifying the monomer, its nature and molecular weight of a Polymer ➤ The knowledge of hybridization and electronic effects ➤ Coal analysis, Octane number, Cetane number ➤ Effects of Hardness.
CO4: Ability to design or construct ➤ Heat engine, refrigerator and other machines ➤ Semiconductor based devices and solar power bank ➤ Galvanic and Electrolytic Cell ➤ A model of protective measures to prevent corrosion of metals. ➤ Nanomaterial based advanced materials like nanocatalyst, nanodrugs, nano ➤ Efficient Internal combustion engine reducing knocking ➤ A model of water treatment process and water softening process to remove hardness from water.

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	3	2	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	2	3	1	-	-	-	-	-	-	-	-	-	-	1	1	-
CO3	2	3	2	1	-	-	-	-	-	-	-	-	-	-	1	1
CO4	2	2	3	-	-	-	-	-	-	-	-	-	-	-	1	1
AVG	2.25	2.75	2	1	-	-	-	-	-	-	-	-	-	1	1	1



Course Name: Basic Electrical Engineering

Course Code: EE201

Contacts: 4L

Credit: 4

Prerequisite: Knowledge of Physics and Mathematics in 10+2 standards

Course Objective:

Impart a basic knowledge of electrical quantities such as current, voltage, power, energy and frequency to understand the impact of technology in a global and societal context; provide working knowledge for the analysis of basic DC and AC circuits used in electrical and electronic devices; to explain the working principle, construction, applications of DC machines, AC machines & measuring instruments; highlight the importance of transformers in transmission and distribution of electric power.

Course Outcome: After completion of this course student will be able to

EE201.1:	Predict the behavior of any electrical and magnetic circuits.
EE201.2:	Formulate and solve complex AC, DC circuits.
EE201.3:	Identify the type of electrical machine used for that particular application.
EE201.4:	Realize the requirement of transformers in transmission and distribution of electric power and other applications.
EE201.5:	Function on multi-disciplinary teams.

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
EE201.1	3	3	-	-	-	-	-	-	-	-	-	1	-	-	-
EE201.2	2	3	3	-	-	-	-	-	-	-	-	-	-	2	2
EE201.3	-	-	-	3	-	-	2	-	-	-	-	-	-	2	2
EE201.4	-	2	3	-	-	-	1	-	-	-	-	-	2	2	2
EE201.5	-	-	-	-	-	1	-	2	-	-	-	-	-	-	-
AVG	2.5	2.6	3	3		1	1.5	2	-	-	-	-	2	2	2

Course Name: Computer Fundamentals & Principle of Computer Programming

Course Code: CS 201

Contacts: 3L + 1T = 4

Total No. of Lectures: 40

Credits: 4

Prerequisite: Knowledge of Mathematics, Physics.

Course Objective: The course is designed to provide complete knowledge of C language; students will be able to develop logics which will help them to create programs, applications; learners would be able to enhance their analyzing and problem solving skills and use the same for writing programs in C.



Course Outcome: After completion of this course student will be able to

- CS201.1:** Understands the concept of anatomy of computer and differentiate among different programming languages for problem solving.
- CS201.2:** Analyze real life problems and design algorithm.
- CS201.3:** Apply the concept of conditional and iterative statements to write C programs.
- CS201.4:** Execute arrays, functions, pointers, structures and apply these concepts to solve real time problems.
- CS201.5:** Create a significant project using the concept of C programming.

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CS201.1	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CS201.2	2	3	3	2	-	-	-	-	-	-	-	-	1	-	1
CS201.3	2	3		2	2	-	-	-	-	-	-	-	1	1	2
CS201.4	3	2	3	2	2	-	-	-	-	-	-	-	1	2	-
CS201.5	3	-	-	-	3	-	-	1	2	1	-	3	-	-	3
Avg	2.6	2.5	2.3	2	2.3	-	-	1	2	1	-	3	1	1.5	2

Course Name: Engineering Thermodynamics & Fluid Mechanics

Course Code: ME 201

Contacts: 3L + 1T = 4

Credits: 4

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics.

Course Objective: To understand the basic relationship of heat and work transfer for developing the primary concept of an engine.

Course Outcome: Upon successful completion of this course, the student will be able to:

1. Explaining thermodynamic equilibrium, heat & work transfer, First law and its application.
2. Understand the basic concepts of Heat Engine, Entropy from Second law of thermodynamics.
3. Analyze the thermodynamic characteristics of a pure substance and its application in power cycles (Simple Rankine cycles, Air Standard cycles)
4. Understand the basic principles of fluid mechanics, and ability to analyze fluid flow problems with the application of the momentum and energy equations.

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME201.1	3	3	2	2	-	1	1	1	1	-	1	2	-	1	-
ME201.2	3	3	2	2	-	1	2	-	1	-	1	2	-	2	-
ME201.3	2	2	1	1	-	2	1	-	-	-	-	1	1	1	2
ME201.4	3	3	2	2	-	1	1	-	-	-	1	1	-	1	1
Average	2.75	2.75	1.75	1.75	-	1.25	1.25	1	1	-	1	1.5	1	1.5	1.5



Second Semester Practical

Course Name: Computer Fundamentals & Principle of Computer Programming Lab

Course Code: CS291

Contacts: 3P/Week

Credit: 2

Prerequisite: Basic knowledge of computer

Course Objective:

To develop an understanding of the design, implementation, and compilation of a C program, to gain the knowledge about pointers, a fundamental for understanding data structure issues, to understand the usage of user defined data type for application development.

Course Outcome

After completion of this course student will be able to

CS291.1: Understand the concept of data types, loops, functions, array, pointers, string, structures and files.

CS291.2: Design flow-chart, algorithm and program logic.

CS291.3: Analyze problems, errors and exceptions.

CS291.4: Apply programming concepts to compile and debug c programs to find solutions.

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CS291.1	3	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CS291.2	2	3	3	2	2	-	-	-	-	-	-	-	1	2	2
CS291.3	2	3	3	2	2	-	-	-	-	-	-	-	1	2	2
CS291.4	3	-	3	2	2	-	-	-	2	-	-	3	-	-	2
AVG	2.5	3	3	2	2	-	-	-	2	-	-	3	1	2	2

Chemistry-1 Lab

Code: CH291

Contacts: 3

Credits: 2

Prerequisite: Knowledge of Chemistry in 10+2 standards

Course Objective: Acquiring knowledge on standard solutions and the various reactions in homogeneous and heterogeneous medium. Understanding the basic principles of pH meter and conductivity meter for different applications and analyzing water for its various parameters. Synthesis of Polymeric materials and Nano-materials.

Course Outcome: After completion of this course student will be able to

CH291.1: Measure water quality parameters like alkalinity, hardness and amount of dissolved oxygen, Chloride ions, iron etc. to be applied for industrial purpose.

CH291.2: Measure the conductivity and pH value of different solutions.

CH291.3: Fabricate polymer based materials (e.g. Bakelite) which is used to form electrical insulator parts.

CH291.4: Measure the oxidizing and reducing power of materials.

CH291.5: Synthesize nano particles for catalytic and medicinal activities.

CO-PO Mapping



	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CH291.1	3	3	3	-	-	-	-	-	-	-	-	-	1		
CH291.2	3	2	2	-	-	-	-	-	-	-	-	-		1	
CH291.3	3	1	3	2	-	-	-	-	-	-	-	-	2	2	2
CH291.4	3	3	3	-	-	-	-	-	-	-	-	-	2		2
CH291.5	3	2	-	3	-	-	-	-	-	-	-	-			3
Avg	3	2.2	2.7	2.5	-	-	-	-	-	-	-	-	1.6	1.5	2.6

Course Name: Basic Electrical Engineering Lab

Course Code: EE 191/EE291

Contacts: 3P

Credits: 2

Prerequisite: Knowledge of Mathematics and Physics in 10+2 standards

Course Objective: Provide knowledge for the analysis of basic electrical circuit, to introduce electrical appliances, machines with their respective characteristics. The ability to conduct testing and experimental procedures on different types of electrical machines and to analyze the operation of electric machines under different loading conditions.

Course Outcome After completion of this course student will be able to

EE291.1: Analyze the response of any electrical circuit and network

EE291.2: Troubleshoot the operation of an electrical apparatus

EE291.3: Select a suitable measuring instrument for a given application

EE291.4: Gain the knowledge of various parts and test of DC machine and transformer

EE291.5: Incorporate the measuring error with actual value and calibrate the instruments

CO-PO Mapping

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
EE 291.1	1	2	-	2	-	-	-	-		-	-	-	1	1	
EE 291.2	-	3	-	2	-	-	-	-	2	-	-	-	-	2	2
EE 291.3	-	3	-	3	1	-	-	-	2	-	-	-	-	-	-
EE291.4	-	3	-	2		-	-	-		-	-	-	-	-	-
EE291.5	-	2	-	3	1	-	-	-	2	-	-	-	1	1.5	2

Course Name: Engg. Drawing & Graphics

Course Code: ME291

Contacts: 3P/Week

Credit: 2

Pre requisites: Higher Secondary with Physics, Chemistry & Mathematics



Course Objective: To learn basics of engineering drawing or drafting as a tool for expressing an engineering design

Course Outcomes: Upon successful completion of this course, the student will be able to:

1. Learn basics of drafting and use of drafting tools which develops the fundamental skills of industrial drawings.
2. Know about engineering scales, dimensioning and various geometric curves necessary to understand design of machine elements.
3. Understand projection of line, surface and solids to create the knowledge base of orthographic and isometric view of structures and machine parts.
4. Become familiar with computer aided drafting useful to share the design model to different section of industries as well as for research & development.

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME 291.1	2	-	1	2	-	1	-	-	1	-	-	1	1	1	1
ME 291.2	3	-	2	2	-	1	-	-	1	1	-	1		1	2
ME 291.3	2	2	2	1	-	1	-	-	1	-	-	1		1	-
ME 291.4	1	-	2	2	2	1	-	-	1	1	-	1	1	1	3
Average	2	2	1.75	1.75	2	1	-	-	1	1	-	1	1	1	2



3RD SEMESTER CURRICULUM

Sl. No.	Subject Type	Subject Code	Subject Name	Contact hours/Week				Total Credits
				L	T	P	Total	
	A. THEORY							
1	PC	ME 301	APPLIED THERMODYNAMICS	3	0	0	3	3
2	PC	ME 302	STRENGTH OF MATERIALS	3	0	0	3	3
3	PC	ME 303	FLUID MECHANICS	3	0	0	3	3
4	ES	EE(ME)301	ELECTRICAL MACHINES	3	0	0	3	3
5	BS	M(ME) 301	MATHEMATICS- III	3	0	0	3	3
6	BS	PH(ME) 301	PHYSICS- II	3	0	0	3	3
Total of Theory							18	18
	B. PRACTICAL							
7	PC	ME 391	STRENGTH OF MATERIALS LAB	0	0	3	3	2
8	PC	ME 392	MACHINE DRAWING- I	0	0	3	3	2
9	ES	EE(ME)391	ELECTRICAL MACHINES LAB	0	0	2	2	1
10	BS	PH(ME)391	PHYSICS-II LAB	0	0	3	3	2
Total of Practical				0	0	12	11	7
	C. SESSIONAL							
11	MC	MC 381	TECHNICAL SKILL DEVELOPMENT	0	0	2	2 units	0
Total: Eleven				18	0	13	31	25



THEORY COURSES

Course Name: **Applied Thermodynamics**

Course Code: **ME301**

Contact Hour/Week (L:T:P) : **3L**

Credits: **3**

Total Lectures: **36L**

Full Marks = **100** (30 for Continuous Evaluation; 70 for End Semester Exam.)

Pre requisites: Basic Thermodynamics (ME201)

Course Objectives: To analyze all relationships of heat and work transfer and develop detailed knowledge of vapour and gas power systems.

Course Outcomes: Upon successful completion of this course the student will be able to:

ME301.1 Understand the second laws limitation of thermodynamic efficiencies and sort out realistic and unrealistic thermodynamic system claims.

ME301.2 Demonstrate Entropy and Energy analysis of thermal systems to evaluate sustainability of practical equipments in industries.

ME301.3 Analyze the performance variables of vapor power and gas power cycles, evaluate losses and learn the modifications practiced in modern power sectors.

ME301.4 Apply the idea about gas compressors and the basics of Refrigeration & Air Conditioning to develop various project works.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME301.1	3	2	1	2	-	1	1	1	-	-	1	1	2	1	1
ME301.2	2	2	2	3	-	1	2	1	-	-	1	1	2	1	1
ME301.3	3	3	2	3	-	2	2	-	-	-	1	1	3	3	2
ME301.4	2	3	2	2	-	2	2	-	-	-	2	1	3	2	3
Avrg.	2.5	2.5	1.75	2.5		1.5	1.75	1			1.25	1	2.5	1.75	1.75

Course Name: **Strength of Materials**

Course Code: **ME302**

Contact Hour/Week(L:T:P) : **3L**

Credit : **3**

Total Lectures: **34L**

Full Marks = **100** (Internal Evaluation-30; End Semester Exam.-70)

Pre requisites: Engineering Mechanics, Basic Physics and Mathematics.

Course Objectives: To impart detailed knowledge on material strength while subjected to various stress and strain in mechanical bodies.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

ME302.1 Apply knowledge of mathematics in analyzing tensile and compressive strength as well as able to understand and identify compound stresses developed in a material.



ME302.2 Analyze shear force and bending moment for designing system components to meet desired characteristics from economic, environmental and social considerations.

ME302.3 Analyze the beam stresses for a safe and sustainable design application and apply in constructive projects.

ME302.4 Understand the effect of torsion on beams and columns for a variety of loading conditions which boosts industrial skills.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME302.1	3	2	1	1	-	2	2	-	-	-	1	2	2	1	2
ME302.2	3	3	2	2	-	3	3	1	-	-	2	2	2	-	3
ME302.3	2	3	2	2	-	3	2	2	-	-	1	2	2	-	2
ME302.4	2	2	2	2	-	2	2	1	-	-	1	2	2	-	-
Avg.	2.5	2.5	1.7	1.7		2.5	2.2	1.3			1.2	2	2	1	2.3

Course Name: **Fluid mechanics**

Course Code: **ME303**

Contact Hour/Week(L:T:P) : **3L**

Credit : **3**

Contact Hours/Week (L:T:P): **3:0:0**

Total Lectures: **36L**

Full Marks = **100** (30 for Continuous Evaluation; 70 for End Semester Exam.)

Pre requisites: Basic fluid mechanics (ME201)

Course Objectives: To introduce and explain fundamentals of Fluid Mechanics which is useful in the applications of Aerodynamics, Hydraulics, Marine Engineering, Gas dynamics, Heat Transfer, Power Plant etc.

Course Outcomes:

Upon successful completion of this course, the student will be able to:

ME303.1. Classify different fluid flow properties and analyze hydrostatic forces on flat or curved surfaces.

ME303.2. Explore the detailed analysis of kinematics and dynamics of fluid for laminar and turbulent flow and exploit the conservation equations for the flow regimes of practical interest.

ME303.3. Learn about boundary layer theory for a variety of constraints and understand the basics of a turbulent flow.

ME303.4. Explain the basics of compressible flow and apply for dimensional analysis for practical prototyping.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME303.1	2	2	1	1	-	-	-	-	-	-	-	-	2	1	1
ME303.2	3	3	2	2	-	-	-	-	-	-	-	1	2	1	2
ME303.3	3	2	1	2	-	-	-	-	-	-	-	1	3	2	2
ME303.4	2	2	1	1	-	-	-	-	-	-	-	1	3	2	3
Avg.	2.5	2.25	1.25	1.5	-	-	-	-	-	-	-	1	2.5	1.5	2



Course Name Electrical Machine
Course Code EE(ME)301
Course Credit 3
Contact Hour 3L
Pre-requisite Basic Electrical

Course Objective

The objectives of this course are

1. To teach principles of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors and how they work.
2. To empower students to understand the working of electrical equipment used in everyday life.
3. To expose the students to the concepts of various types of electrical machines and applications of electrical machines.
4. To analyze power requirements, power capability, efficiency, operating characteristics, control requirements and electrical demands of these machines.

Course Outcome

On completion of the course students will be able to

EE(ME)301.1 Formulate and then analyze the working of any electrical machine under loaded and unloaded conditions.

EE(ME)301.2 Understand and explain the principle of operation and performance of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.

EE(ME)301.3 Analyze the response of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.

EE(ME)301.4 Troubleshoot the operation of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.

EE(ME)301.5 Analyze given require specification of electrical machine and select a suitable measuring instrument for a given application.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
EE(ME)301.1	2		1	1	-	-	-	-	-	-	-	-	1	-	-
EE(ME)301.2	2	2	2	2	-	-	-	-	-	-	-	1	-	2	2
EE(ME)301.3	2	2	1	2	-	-	-	-	-	-	-	1	1	1	-
EE(ME)301.4	2		1	1	-	-	-	-	-	-	-	1	-	-	-
EE(ME)301.5	1	2	1	1	-	-	-	-	-	-	-	1	1	2	2
Avrg.	2	2	1.25	1.5	-	-	-	-	-	-	-	1	1	1.6	2

Course Name: Mathematics-III

Course Code: M 301

Contact: 3L+1T

Credits: 4

Total Lectures: 44L



Full Marks = 100 (30 for Continuous Evaluation; 70 for End Semester Exam.)

Prerequisite: Any introductory course on Calculus and Combinatorics.

Course Objective: The purpose of this course is to provide fundamental concepts of Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equation, Partial Differential Equations.

Course Outcome:

On successful completion of the learning sessions of the course, the learner will be able to

M(ME)301.1: Recall the distinctive characteristics of mathematical approaches like Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equation, Partial Differential Equations.

M(ME)301.2: Understand the theoretical workings of mathematical approaches like Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equations, and Partial Differential Equations to evaluate the various measures in related field.

M(ME)301.3: Apply various principles of Fourier Series & Fourier Transform, Calculus of Complex Variables, Probability Distribution, Correlation & Regression, Ordinary Differential Equations, Partial Differential Equations to solve various problems.

CO-PO Mapping:

CO \ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P 10	P 11	P 12	PSO 1	PSO 2	PSO 3
M(ME) 301.1	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
M(ME) 301.2	3	2	-	-	-	-	-	-	-	-	-	1	2	-	-
M(ME) 301.3	3	2	2	-	-	-	-	-	-	-	-	1	2	-	-
Avg.	3	2	2	-	-	-	-	-	-	-	-	1	2	-	-

Course Name: **Physics-II**

Course Code: **PH-(ME)301**

Credit: **3**

Contact Hours/Week (L:T:P): **3:0:0**

Total Lectures: **33L**

Full Marks = **100 (Internal Assessment-30; End Semester Exam-70)**

Course Objective:

To understand and apply the knowledge of advance physics in analyzing and solving problems of Mechanical Engineering

Course Outcome:

At the end of the course students' should have the

- | |
|--|
| CO1: ability to apply the knowledge of
➤ Electrostatics to explain actions of dielectrics |
|--|



➤ Magnetism and semiconductor physics in data storage ➤ Schrödinger equation in physical problems including semiconductor devices ➤ Band theory explain electrical conductivity of metal, insulators and semiconductor
CO2: Ability to analyze ➤ Use of insulators and magnetic materials in modern electrical circuitry and storage purpose. ➤ The inability of direct measurement technique in quantum mechanics and role of operators ➤ The need of suitable theoretical methods to explain electron transport in all types of materials ➤ Role of defected solid structure in perspective of mechanical engineering
CO3: ability to design and realize ➤ Mathematical frame work for making measurements in quantum mechanical situation\ ➤ Mechanical engineering with new generation materials like Graphene
CO4: Ability to conduct experiments using ➤ Dielectric under alternating field ➤ Intrinsic semiconductor under electric and magnetic field ➤ Various types of magnetic materials ➤ Semiconductor Photovoltaic cell, Light emitting diodes, Light dependent resistor ➤ Band theory and electron transport in a semiconductor
CO5: Ability to communicate effectively, write reports and make effective presentation using available technology ➤ on topics allied to the subject particularly in areas of applications shared in student seminar
CO6: Ability to engage in independent self-study to formulate, design, enhance, demonstrate ➤ New light elements with novel physical property

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1
CO4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO6	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Avg	3	1	-	-	-	-	-	-	-	-	-	-	-	-	1.5

Course Name: **PHYSICS-II Lab**

Course Code: **PH (ME) 391**

Credits: **2**

Contact Hours/Week (L:T:P): **0:0:3**

Examination Scheme: **Total 100 [Internal Assessment - 40, End Semester Exam - 60]**

*At least 7 experiments to be performed during the semester

Course Objective: To enable students carry out several experiments on applied physics and apply the knowledge in innovative solution in mechanical engineering.

Course Outcome: At the end of the course students' should have the



CO1: ability to define, understand and explain
➤ instruments used in spectroscopy ➤ Oscilloscope (digital) ➤ Solenoidal field, Magnetization, demagnetization ➤ Cathitometer
CO2: ability to apply the knowledge of
➤ Hysteresis in magnetic storage ➤ Photovoltaic action in solar cell ➤ Band theory
CO3: Ability to analyze
➤ Role of magnetic field in changing resistance of a sample
CO4: Ability to conduct experiments using
➤ Intrinsic semiconductor ➤ Temperature sensor ➤ Photovoltaic cell, Light emitting diodes, Light dependent resistor ➤ Various types of magnetic materials ➤ Curie temperature of the given ferroelectric material
CO5: Ability to communicate effectively, write reports and make effective presentation using available technology
➤ on presentation of laboratory experiment reports ➤ on presentation of innovative experiments
CO6: Ability to engage in independent self-study to perform
➤ Performing mini project with the lab

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	1
CO2	-	-	-	3	-	-	-	-	-	-	-	-	1	1	1
CO3	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-
CO4	-	-	-	-	-	-	-	-	-	3	--	-	2	-	2
Avg	2	-	-	3	-	-	-	-	1	3			1.3	1.5	1.3

Course Name: Electrical Machines Lab

Course Code: ME(EI)391

Contact Hour: 3 hr./week

Semester: 3

End Semester Examination: 60 marks

Internal Assessment: 40 marks

Course Outcome

On completion of the course students will be able to

ME(EI)391.1 Formulate and then analyze the working of any electrical machine under loaded and unloaded conditions.

ME(EI)391.2 Analyze the response of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.

ME(EI)391.3 Troubleshoot the operation of DC machine, Three Phase Induction Motor, Synchronous Machine and Fractional kW Motors.



Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
EE(ME) 391.1	2	-	1	1	-	-	-	-	-	-	-	-	-	-	2
EE(ME) 391.2	2	2	2	2	-	-	-	-	-	-	-	1	1	2	2
EE(ME) 391.3	2	2	1	2	-	-	-	-	-	-	-	1	1	2	2
Avg.	2	2	1	1.5	-	-	-	-	-	-	-	1	1	2	2

Course Name: **Strength of Material Lab**

Course Code: **ME 391**

Credit : **2**

Contact Hours/Week (L:T:P): **0:0:3**

Full Marks = **100 (Internal Evaluation - 40; End Semester Exam Evaluation - 60.)**

Course Objective:

To make students learn evaluating mechanical properties of a given specimen or structure.

Course Outcomes: Upon successful completion of this course, the student will be able to:

ME391.1 Analyze the tensile and compressive strength of a specimen for applying in a practical design based project work.

ME391.2 Determine the hardness, impact strength, fatigue strength to analyze the application of a specific material for a given design requirements for different loading conditions of structures or machines.

ME391.3 Understanding the bending in beams and to analyze the bending stresses which further build the foundation of using modern analysis softwares.

ME391.4 Evaluate the capacity of a material to withstand torsional stresses for a safe and sustainable design of machine elements.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME391.1	1	-	3	-	-	-	-	-	3	-	2	-	2	1	2
ME391.2	1	-	2	-	-	-	-	-	2	-	2	-	2	1	2
ME391.3	1	-	2	-	3	1	-	1	2	-	2	-	3	2	2
ME391.4	1	2	3	-	-	-	-	-	2	-	2	-	1	2	1
Avg.	1	2	2.5	-	3	1	-	1	2.25	-	2	-	2	1.5	1.5

Course Name: **Machine Drawing I**

Course Code: **ME 392**

Credit : **2**

Contact Hours/Week (L:T:P): **0:0:3**

Full Marks = **100 (Internal Evaluation - 40; End Semester Exam Evaluation - 60.)**

Prerequisite: Basic knowledge of Machine elements, engineering drawing/drafting



Course Objective: The objective of this lab is to practically demonstrate the failure criteria of different mechanical elements or bodies.

Upon successful completion of this course, the student will be able to:

ME392.1 Demonstrate the isometric view of a given three dimensional object/part.

ME392.2 Apply the concept of orthogonal projection of a solid body and assemble drawing using part drawings.

ME392.3 Evaluate various materials and Mechanical components conventionally.

ME392.4 Classify the shape and structure of different types of screws, keys and Couplings.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME392.1	1	-	3	-	-	-	-	-	3	-	2	-	2		
ME392.2	1	-	2	-	-	-	-	-	2	-	2	-		1	
ME392.3	1	-	2	-	3	1	-	1	2	-	2	-	2		2
ME392.4	1	2	3	-	-		-	-	2	-	2	-		2	
Avrg.	1	2	2.5		3	1		1	2.25		2		2	1.5	2

Course Name: Technical Skill Development,

Course Code: MC 381

Prerequisite: Basic Communication skill

Course Objective: To grow a potential of industrial skill development for future career.

Course Outcomes: Upon successful completion of this course, students will be able to:

MC381.1 Nurture their subject knowledge and find their relevance to practical application

MC381.2. To create more laboratories works and to explore new events.

MC381.3. To create small projects for the development of the society and environment.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
MC381.1	2	-	-	-	-	1	2	-	2	-	-	-	2	-	3
MC381.2	-	-	-	-	-	1	-	-	2	-	-	-	-	2	3
MC381.3	-	-	-	-	-	3	-	-	2	-	-	-	2	-	3
Avrg.	2	-	-	-	-	1.6	2	-	2	-	-	-	2	2	3

Course Contents: Practice of verbal and Written Communication on small scale technical projects



4th Semester CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours/Week				Total Credits
			L	T	P	Total	
THEORY:							
PC	ME 401	Fluid Machinery	3	0	0	3	3
PC	ME 402	Primary Manufacturing Process	3	0	0	3	3
PC	ME 403	Engineering materials	3	0	0	3	3
PC	ME 404	Mechanisms	3	0	0	3	3
BS	M(CS)401	Numerical methods	3	0	0	3	3
HU	HU 401	Environmental science	2	0	0	2	2
Total of Theory			17	0	0	17	17
PRACTICAL:							
PC	ME 491	Fluid mechanics & hydraulic machines lab	0	0	3	3	2
PC	ME 492	Manufacturing technology lab	0	0	3	3	2
PC	ME 493	Material testing lab	0	0	3	3	2
PC	ME 494	Machine drawing-II	0	0	3	3	2
BS	M(ME)491	Numerical methods lab	0	0	3	3	2
Total of Practical			0	0	15	15	10
SESSIONAL :							
HS	HU 481	Technical report writing & language practice	0	0	2	2	1
Total of Semester			17	0	17	34	28

Course Name: **Fluid Machinery**

Course Code: **ME401**

Contact Hour/Week (L:T:P) : **3:0:0**

Credits: **3**

Total Lectures: **36L**

Full Marks = **100** (Internal Evaluation - 30; End Semester Exam - 70)

Prerequisite: Knowledge of Fluid Mechanics and basic applications.

Course Objective: To understand the working principle of various hydraulic machines and judge their performance.

Course Outcomes: Upon successful completion of this course, students will be able to:

ME401.1. Understand the mechanism of jet propulsion for a variety of conditions and analyze it's effects for practical applications.

ME401.2. Learn the design and working principle of hydraulic turbines and apply in a practical case study or project work on hydel plants.



ME401.3. Analyze the working of centrifugal and reciprocating pumps and calculate their performance parameters of practical interest in a plethora of applications.

ME401.4. Get the knowledge about the working principles of various modern hydraulic machines for varied industrial applications.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME401.1	3	2	2	1	-	-	-	-	-	-	1	-	1	2	1
ME401.2	2	3	2	2	-	1	-	-	-	-	1	1	1	3	1
ME401.3	2	2	1	1	-	1	-	-	-	-	1	-	1	3	1
ME401.4	2	3	2	-	1	1	1	-	-	-	1	2	-	1	1
Avg.	2.25	2.5	1.75	1.3	1	1	1	-	-	-	1	1.5	1	2.25	1

Course Name: **Primary Manufacturing Processes**

Course Code: **ME402**

Contact Hour/Week (L:T:P) : **3:0:0**

Credits: **3**

Total Lectures: **39L**

Full Marks = **100** (Internal Evaluation - 30; End Semester Exam - 70)

Prerequisite: Knowledge of basic workshop practices, material science.

Course Objective: To impart detailed knowledge on various primary manufacturing processes like casting, forming welding and power metallurgy.

Course Outcomes: Upon completion of this course, students will be able to:

ME402.1 Understand the basics of manufacturing processes and concerned behavior of material properties.

ME402.2 Explain the details of casting process, design of gating system and solidification for different molding design.

ME402.3 Define the basic of welding and forming techniques and modern improvements for sophisticated metal works.

ME402.4 Explain the basics of powder metallurgy to develop knowledge on modern nano-manufacturing for applied project works.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME402.1	3	-	2	1	-	1	-	-	-	-	-	-	1	1	1
ME402.2	3	3	3	2	-	1	-	-	-	1	-	-	2	2	2
ME402.3	3	2	3	2	-	2	-	-	-	1	-	1	3	2	2
ME402.4	3	2	3	3	-	2	-	-	2	1	2	1	2	1	3
Avg.	3	2.33	2.75	2	-	1.5	-	-	2	1	2	1	2	1.5	2

Course Name: **Engineering Materials**

Course Code: **ME403**

Contact Hour/Week (L:T:P) : **3:0:0**

Credits: **3**



Total Lectures: **36L**

Full Marks = **100** (Internal Evaluation - 30; End Semester Exam - 70)

Prerequisite: Basic Physics and Chemistry.

Course Objectives: To impart overall knowledge of material structure, properties and treatments used in industries for applying them in engineering applications.

Course Outcomes: Upon successful completion of the course the students will be able to:

1. Classify the different properties and classifications of materials that determine their applicability and concept of atomic structure, crystal structure, various imperfections in solids and solidifications.
2. Explain Iron-carbon equilibrium phase diagram, isomorphous and eutectic phase diagrams and distinguish between steels, cast irons and various non-ferrous alloys and describe methods, purposes and control of various heat treatment processes.
3. Explain with the special characteristics and applications of various types of polymer, ceramic and Composites.
4. Define the idea about corrosion with their types and control procedures of changing different mechanical properties of metals.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME403.1	3	2	1	-	1	2	1	-	-	-	3	-	2	-	-
ME403.2	2	3	2	-	3	1	2	-	-	-	2	-	1	-	-
ME403.3	3	3	2	-	2	3	2	-	-	-	2	1	-	-	2
ME403.4	2	3	1	-	3	2	1	-	-	-	2	1	-	-	2
Avg.	2.5	2.75	1.5	-	2.25	2	1.5	-	-	-	2.25	1	1.5	-	2

Course Name: **Mechanism**

Course Code: **ME404**

Contact Hour/Week (L:T:P) : **3:0:0**

Credits: **3**

Total Lectures: **36L**

Full Marks = **100** (Internal Evaluation - 30; End Semester Exam - 70)

Prerequisite: Basic Physics.

Course Objectives: To develop the knowledge on theory of machines for Analysis and design of gears, cams, and linkages.

Course Outcomes: Upon successful completion of this course, the student will be able to:

- ME4041.** Identify the basic relations between distance, time, velocity, and acceleration and distinguish between kinematic and kinetic motion.
- ME4042.** Design basic gear trains, cam systems and also create a schematic drawing of a real-world mechanism.
- ME4043.** Determine the degrees-of-freedom (mobility) of a mechanism.
- ME4044.** Solve graphical and analytic methods to study the motion of a planar mechanism.



Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME404.1	3	3	2	2	-	-	-	-	-	-	-	-	-	-	1
ME404.2	3	2	3	1	-	-	-	-	-	-	2	1	1	1	2
ME404.3	2	1	1	-	1	-	-	-	-	-	-	-	1	1	-
ME404.4	3	3	1	-	-	-	-	-	-	-	3	1	-	-	-
Avg.	2.75	2.25	1.75	1.5	1	-	-	-	-	-	2.5	1	1	1	1.5

Course Name: **Environmental Science**

Course Code: **ME401**

Contact Hour/Week (L:T:P) : **0:0:2**

Credits: **2**

Full Marks = **100** (Internal Evaluation - 40; End Semester Exam - 60)

Course Objective:

To make student enough cognizant about their environment in terms of natural resources and all type of environmental pollutions questing the sustainability of human race.

Course Outcomes:

1. Demonstrate understanding of the complex interactions of humans and ecological systems in the natural world.
2. Learn to interpret and apply basic statistical analysis or systems modeling methodology in environmental analysis.
3. Interpret, synthesize, and apply a wide range of scientific literature in the ecological and environmental sciences, particularly dealing with both climate change and global change.
4. Interpret a wide range of scientific literature in biology, ecology, and environmental science and apply this information to problem-solving analysis, specifically in the realms of environmental and natural resource sciences and sustainability.
5. Prepare technical reports and analyses of environmental, resource ecology, and sustainability issues and present analytical results and conclusions effectively in both written and oral communication.
6. Interpret environmental, resource management, and sustainability conflicts from multiple perspectives.
7. Effectively analyze and integrate the social and natural sciences to understand diverse environmental and sustainability challenges ranging from local issues to global environments

Course Name: **Numerical Methods**

Course Code: **M(ME)401**

Contact Hour/Week (L:T:P) : **3:0:0**

Credits: **3**

Total Lectures: **33L**

Full Marks = **100** (Internal Evaluation - 30; End Semester Exam - 70)

Prerequisite: Concept of Calculus and Algebra.

Course Objective: The purpose of this course is to provide basic understanding of the derivation and the use of the numerical methods along with the knowledge of finite precision arithmetic.



Course outcome: On successful completion of the learning sessions, the learner will be able to:

M(ME)401.1: Recall the distinctive characteristics of various numerical techniques and the associated error measures.

M(ME)401.2: Understand the theoretical workings of various numerical techniques and to solve the engineering problems.

M(ME) 401.3: Apply the principles of various numerical techniques to solve various problems.

Course Articulation Matrix

PO CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
M(ME) 401.1	3	2	-	-	-	-	-	-	-	-	-	1	-	-	2
M(ME) 401.2	3	2	-	-	-	-	-	-	-	-	-	1	-	2	-
M(ME) 401.3	3	2	2	-	-	-	-	-	-	-	-	1	-	2	2
Avg.	3	2	0.66	-	-	-	-	-	-	-	-	1	-	2	2

Course Name: **Numerical Methods Laboratory**

Course Code: **M(CS)491**

Contact Hour/Week (L:T:P) : **0:0:3**

Credits: **2**

Full Marks = **100** (Internal Evaluation - 30; End Semester Exam - 70)

Prerequisite: Any introductory course on C/ Mat lab.

Course Objective: The purpose of this course is to provide basic programming skills for solving the problems in numerical methods.

Course outcome: On successful completion of the learning sessions, the learner will be able to:

M(CS)491.1: Apply the programming skills to solve the problems using multiple numerical approaches.

M(CS)491.2: Analyze if the results are reasonable, and then interpret and clearly communicate the results.

CO-PO Mapping:

PO CO	PO 1	P O 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	P O 10	P O 11	P O 12	PSO 1	PSO 2	PSO 3
M(ME) 491.1	2	1	-	-	3	-	-	-	-	-	-	1	2	-	-
M(ME) 491.2	2	1	-	-	3	-	-	-	-	-	-	1	2	-	-
Avg.	2	1	-	-	3	-	-	-	-	-	-	1	2	-	-

Course Name: **Fluid mechanics & Hydraulic Machines Lab**

Course Code: **ME491**

Contact Hour/Week (L:T:P) : **0:0:3**

Credits: **2**

Full Marks = **100** (Internal Evaluation - 40; End Semester Exam - 60)

Prerequisite: Knowledge of hydraulic machines

Course Objective: To expose students for operating hydraulic machines by themselves and measure their performance.



Course Outcomes: Upon successful completion of this course, the student will be able to:

ME491.1. Recall the coefficient of discharge for several flow measuring devices to explore the reasons of differences in theoretical calculation and practical measurements.

ME491.2. Demonstrate hydraulic turbine and carry out their performance study useful hydel power plants.

ME491.3. Examine and understand pump working characteristics under given constraints.

ME491.4. Estimate frictional forces applicable in a flow channel to determine major and minor losses.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME491.1	2	-	1	-	-	-	-	-	2	1	-	-	-	1	-
ME491.2	2	-	3	-	-		1	-	2	1	1	-	2	1	1
ME491.3	2	-	1	-	-	1		-	2	1	1	-	2	-	-
ME491.4	2	-	1	1	-	-	-	-	2	1	1	-	-	1	-
Avg.	2	-	1.25	1		1	1		2	1	1	-	1	1	1

Course Name: **Manufacturing Technology Lab**

Course Code: **ME492**

Contact Hour/Week (L:T:P) : **0:0:3**

Credits: **2**

Full Marks = **100** (Internal Evaluation - 40; End Semester Exam - 60)

Course Objective:

To get the practical knowledge of several steps of casting, pattern usage, mould creation, gating design, produce a casting and check casting defects.

Course Outcome: Upon the completion of the course the student would be able to

ME492.1 Identify and create basic parts and assemblies using powered and non-powered machine shop equipment in conjunction with mechanical documentation

ME492.2. Ascertain product and process quality levels through the use of precision measurement tools and statistical quality control charts

ME492.3. Apply basic welding and forming techniques along with modern improvements for sophisticated metal works

ME492.4. Demonstrate the basics of powder metallurgy for applied project works.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME492.1	1	-	2	1	-	1	-	-	-	-	-	-	1	1	1
ME492.2	1	3	3	2	-	1	-	-	-	1	-	-	2	2	2
ME492.3	0	2	3	2	-	2	-	-	-	1	-	1	3	2	2
ME492.4	0	2	3	3	-	2	-	-	2	1	2	1	2	1	3
Avg.	1	2.33	2.75	2	-	1.5	-	-	2	1	2	1	2	1.5	2

Course Name: **Material testing Lab**

Course Code: **ME493**



Contact Hour/Week (L:T:P) : 0:0:3

Credits: 2

Full Marks = 100 (Internal Evaluation - 40; End Semester Exam - 60)

Prerequisite: Knowledge of Material Science, Basic Sciences.

Course Objective: To test several properties of material like ductility, surface roughness, malleability, hardenability etc.

Course Outcome: Upon the completion of the course the student would be able to

ME493.1. Determine toughness value of industrial specimens.

ME493.2. Analyze various heat treatment methods for a given specimen to observe mechanical properties and grain size.

ME493.3. Find surface or subsurface defects relevant to almost all manufacturing industries.

ME493.4. Evaluate the mechanical properties like drawability, endurance limit of a steel specimen necessary for material selection in design and development.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME493.1	2	-	2	-	1	-	-	-	2	1	-	1	1	-	1
ME493.2	3	-	2	1	2	-	-	-	3	1	2	1	3	-	2
ME493.3	2	-	2	1	1	-	-	-	1	1	1	1	-	-	3
ME493.4	2	-	3	1	2	1	1	-	2	1	2	2	-	-	2
Avg.	2.2	-	2.2	1	2.2	1	1	-	2	1	1.5	1.3	2	-	2

Course Name: **Machine Drawing-II**

Course Code: **ME494**

Contact Hour/Week (L:T:P) : 0:0:3

Credits: 2

Full Marks = 100 (Internal Evaluation - 40; End Semester Exam - 60)

Prerequisite: Engineering Drawing.

Course Objective: To develop the capability of modeling important machine components using CAD.

Course Outcomes: After successful completion of the course, the student would be able to

ME494.1 Run Computer Aided Drafting software like AutoCAD independently.

ME494.2 Model basic two dimensional objects, modify and dimension them to form more complex machine parts of engineering importance.

ME494.3 Understand geometric construction, Solid Modeling concepts and techniques.

ME494.4 Design three dimensional views of important machine parts and explore the plotting techniques for standard presentation.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME494.1	-	-	1	-	3	-	-	-	-	1	-	-	2	-	-
ME494.2	-	-	2	-	3	-	-	-	-	1	1	-	2	-	1
ME494.3	-	-	2	-	3	-	-	-	-	1	2	-	3	-	2
ME494.4	-	-	2	-	2	-	-	-	-	1	2	-	3	-	2
Avg.	-	-	1.7	-	2.7	-	-	-	-	1	1.6	-	2.5	-	1.6



5th SEMESTER CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours/Week				Total Credits
			L	T	P	Total	
THEORY:							
PC	ME 501	HEAT TRANSFER	3	0	0	3	3
PC	ME 502	DESIGN OF MACHINE ELEMENTS-I	3	0	0	3	3
PC	ME 503	DYNAMICS OF MACHINES	3	0	0	3	3
PC	ME 504	METROLOGY & MEASUREMENT	3	0	0	3	3
HU	HU502	VALUES & ETHICS IN PROFESSION	2	0	0	2	2
PE-I	ME 505A	REFRIGERATION& AIR CONDITIONING	3	0	0	3	3
	ME 505B	MECHATRONICS					
	ME 505C	APPLIED FLUID MECHANICS					
PRACTICAL:			17	0	0	17	17
PC	ME591	HEAT TRANSFER LAB	0	0	3	3	2
PC	ME 592	DYNAMICS OF MACHINES LAB	0	0	3	3	2
PC	ME 593	METROLOGY & MEASUREMENT LAB	0	0	2	2	1
PE LAB-I	ME 594 A	REFRIGERATION& AIR CONDITIONING LAB	0	0	3	3	2
	ME 594 B	MECHATRONICS LAB					
	ME 594 C	APPLIED FLUID MECHANICS LAB					
Total of Practical			0	0	11	11	7
SESSIONAL							
PROJECT	ME 581	MINI PROJECT-I	0	0	3	3	2
MC	MC 582	SEMINAR	0	0	2	2	0
		TOTAL: Twelve	17	0	16	33	26



SEMESTER V-Theory

Course Name: Heat Transfer,

Course Code: ME 501

Prerequisite: Basic Physics, Fluid mechanics, Thermodynamics

Course Objectives:

To Study the basic principles of heat transfers like conduction, convection and radiation for analyzing all heat exchanging devices used in industries.

Course Outcomes

Upon successful completion of this course, the student will be able to:

ME 501.1 Understand the basic laws & constraints of heat transfer to analyze problems involving steady state or transient heat conduction in simple geometries.

ME 501.2 Analyze the solutions of free and forced convection problems to apply in modern research sectors of heat and mass transfer.

ME 501.3 Evaluate the radiation heat transfer between black body and gray body surfaces and obtain numerical solutions of combined mode heat transfer problems in practice.

ME 501.4 Estimate the effectiveness of several type of heat exchanger and develop skills for industrial design solutions of complex problems.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME501.1	3	3	1	3	-	1	1	-	-	-	2	1	3	1	1
ME501.2	3	3	2	3	-	1	1	-	-	-	1	2	3	1	2
ME501.3	2	2	1	2	-	1	1	-	-	-	1	1	2	3	1
ME501.4	3	2	2	3	-	2	2	-	-	-	2	2	2	3	2
Avg.	2.75	2.5	1.5	2.75	-	1.25	1.25	-	-	-	1.5	1.5	2.5	2	1.5

Course Name: DESIGN OF MACHINE ELEMENTS-I,

Course Code: ME 502

Prerequisite: Strength of Materials.

Course Objectives: To teach analytical methods of applying the concepts of stress analysis, theories of failure and material science to design, analyze or select commonly used machine components.

Course Outcomes: Upon successful completion student will be able to:

ME502.1 Relate the steps involved in designing and show their relationship with manufacturing activity.

ME502.2 Choose proper materials for the varying design requirements of machine elements depending on their physical and mechanical properties.

ME502.3 Understand the different types of failure modes and judge which criterion to be applied in which situation.

ME502.4 Design and evaluate the performance of several elements like fasteners, shafts, couplings etc. for each applications.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME502.1	2	2	2	2	-	3	1	1	-	-	1	1	2	-	3



ME502.2	3	3	3	2	-	3	1	1	-	-	1	1	3	2	2
ME502.3	3	1	3	-	-	1	-	1	-	-	2	1	3	2	2
ME502.4	2	1	1	-	-	1	-	1	-	1	2	1	2	2	2
AVG	2.5	1.75	2.25	2	-	2	1	1	-	1	1.5	1	2.5	2	2.25

Course Name: DYNAMICS OF MACHINES

Course Code: ME503

Prerequisite: Engineering Mechanics

Course Objectives: To study the dynamic behavior of a machine like vibration, balancing, governing etc.

Course Outcomes: Upon successful completion student will be able to:

ME503.1 Analyze forced and free vibration in mechanical systems to evaluate dynamic forces involved in such systems.

ME503.2 Construct static or dynamic balancing rotating and reciprocating equipments useful in all type of industries.

ME503.3 Analyze the design of governors and flywheels for establishing mechanical control over rotating mechanical linkages.

ME503.4 Recommend the method of retaining the stability of Automobiles, Aeroplanes and ships using the understanding of gyroscopic effects.

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME503.1	3	3	1	2	-	-	-	-	-	-	1	-	2	1	-
ME503.2	3	2	1	2	-	2	-	-	-	-	1	1	-	2	-
ME503.3	3	3	2	2	-	-	-	-	-	-	1	-	-	-	2
ME503.4	1	2	2	2	1	2	-	-	-	-	2	-	-	2	3
Avg.	2.5	2.5	1.5	2	1	2	-	-	-	-	1.25	1	2	1.66	2.5

Course Name: Metrology and Measurement

Course Code: ME504

Prerequisite: Knowledge of basic science upto 12th

Course Objectives:

To develop the knowledge of basic Measuring devices used in industries and research.

Course Outcome: Upon successful completion of this course Students will be able to

ME504.1 Demonstrate the knowledge about length and angle measuring and apply for checking the quality of manufactured products.

ME504.2 Identify the instruments for displacement, temperature, pressure, load and force measurement based on their working principle and their uses in industries.

ME504.3 Examine limit, fit & tolerance and calibrate some specific parameters of engineering interest.

ME504.4 Judge the surface texture, flatness and roughness of a given specimen which is important in all kind of manufacturing.



Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME504.1	2	-	1	-	-	-	-	-	-	-	-	-	1	-	-
ME504.2	3	-	2	-	1	-	-	-	-	-	-	-	2	-	-
ME504.3	3	-	1	-	-	-	-	-	-	-	-	-	2	-	-
ME504.4	2	-	-	2	2	-	-	-	-	-	-	1	1	-	1
Avg.	2.5	-	1.33	2	1.5	-	-	-	-	-	-	1	1.5	-	1

VALUES & ETHICS IN PROFESSION

HU 502

Contacts: 2L

Credits- 2

Course Outcomes: Upon completion of the course, students will be able to:-

HU502.1 Discuss real-world controversies in a sophisticated fashion, using critical thinking and argument analysis.

HU502.2 Identify the strengths and weaknesses of philosophical principles applied to everyday moral problems.

HU502.3 Analyze the coherence in the dynamic relationship between moral principles and moral facts.

HU502.4 Read, comprehend, and criticize philosophical analyses of the central problems in environmental ethics (including the proper boundaries of moral concern, the scarcity of natural resources, the policy options available to regulators and legislators, etc.)

CO-PO Mapping:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
HU502.1	-	2	2	--	--	1	--	3	2	1	--	1	-	-	1
HU502.2	-	--	--	--	--	1	2	3	2	--	--	1	-	-	1
HU502.3		3	1	--	--	2	--	3	1	1	--	1	-	-	1
HU502.4	-	2	--	--	--	2	2	3	1	1	--	1	-	-	1
Avg	-	2.3	1	--	--	1.5	2	3	1.5	1	--	1	-	-	1

Professional Electives I

SL.No.	Course Code	Subject Name
1.	ME505 A	REFRIGERATION AND AIR CONDITIONING
2.	ME 505 B	MECHATRONICS
3.	ME 505 C	APPLIED FLUID MECHANICS



Course Name: REFRIGERATION & AIR CONDITIONING

Course Code: ME505A

Prerequisite: Applied Thermodynamics

Course Objective: To study and analyze various refrigeration systems along with Air Conditioning principle and design.

Course Outcomes

After taking this course the students will be able to:

ME505.1 Explain different types of Refrigeration cycles and its applications in multi compressor and multi evaporator systems.

ME505.2 Evaluate the selection and design of different components of Refrigeration systems

ME505.3 Interpret the knowledge of psychometric processes and air conditioning systems.

ME505.4 Design the air-conditioning system for a given conditions including refrigerating equipments as well as ducting systems.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME505A.1	3	3	2	1	-	1	1	-	-	-	1	-	-	-	1
ME505A.2	2	-	2	-	-	1	3	1	-	-	2	1	2	-	1
ME505A.3	2	2	2	-	-	-	-	-	-	-	1	-	2	-	2
ME505A.4	3	1	3	1	-	1	2	-	-	-	2	2	3	-	3
Avg.	2.5	2	2.25	1	-	1	2	1	-	-	1.5	1.5	2.33	-	1.75

Course Name: MECHATRONICS

Course Code: ME505B

Prerequisite: Fluid Mechanics, Basic Electronics

Course Objectives: To study various type of mechanical actuators and their control system applicable in industrial instrumentation.

Course Outcomes

On successful completion of the course, the student will be able to,

ME505B.1 Describe Mechatronics systems and have an overview of the types of actuators.

ME505B.2 Distinguish between various sensors, transducers, actuators and their applications.

ME505B.3 Understand the basic concept of microprocessor.

ME505B.4 Interpret various signal conditioning units, amplifiers, logic gates and their role in Programmable logic controllers.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME505B.1	2	-	-	-	1	-	-	-	-	-	-	1	-	-	-
ME505B.2	3	1	2	-	2	-	1	-	-	-	1	1	2	-	1
ME505B.3	2	-	1	-	2	-	-	-	-	-	-	1	-	-	1



ME505B.4	3	2	2	-	3	-	1	-	-	-	3	1	3	-	2
Avg.	2.5	1.5	1.66	-	2	-	1	-	-	-	2	1	2.5	-	1.33

Course Name: APPLIED FLUID MECHANICS

Course Code: ME505C

Prerequisite: Basic fluid Mechanics

Course Objectives: Understand and analyze fluid behavior through various conduits and machineries.

Course Outcomes: On successful completion of the course, the student will be able to,

1. Understand the detail of potential flows and infer basic design concept of nozzles to use in practical projects.
2. Analyze forces over an aerofoil section having huge practical application in Aviation industries.
3. Explain the operating principles and constructional details of hydro turbine, compressors, fans and blowers etc.
4. Elaborate the knowledge of designing, testing and installation of modern hydraulic systems.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME505C.1	3	3	2	2	-	-	-	-	3	-	-	-	2	-	1
ME505C.2	3	2	2	3	-	1	-	-	3	-	2	1	1	1	2
ME505C.3	2	2	2	1	-	2	-	-	2	-	2	2	1	2	
ME505C.4	1	1	3	3	-	2	1	1	3	1	3	3	3	3	2
Avg.	2.25	2	2.25	2.25		1.66	1	1	2.75	1	2.33	2	1.75	2	1.66

5th Semester - Practical Courses

Course Name: Heat Transfer Lab

Course Code: ME591

Contacts: 3P

Credits: 2

Prerequisite: Basic Physics, Fluid mechanics, Heat Transfer Theory

Course Objective: Practically measure the heat transfer through different kind of mediums.

Course Outcomes: Upon successful completion student will be able to:

ME591.1 Evaluate the problems involving steady state heat conduction in simple geometries.

ME591.2 Develop experimental solutions for problems involving free and forced convection

ME591.3 Differentiate radiation capabilities of black and grey surfaces by practical observation.

ME591.4 Analyze performance of basic types of heat exchangers and solve complex industrial problems.

Course Articulation Matrix:



CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME591.1	3	1	2	3	-	-	-	-	2	1	1		1	1	2
ME591.2	2	1	2	2	-	-	-	-	2	1	1	1	2	1	2
ME591.3	2	1	1	1	-	-	-	-	2	1	1		1	1	3
ME591.4	3	2	2	3	-	-	-	-	3	1	2	1	2	1	3
Avg.	2.5	1.25	1.75	1.75	-	-	-	-	2.25	1	1.25	1	1.5	1	2.5

Course Name: Dynamics of Machines Lab

Course Code: ME 592

Contacts: 3P

Credits: 2

Prerequisite: Theory of machines, Dynamics of Machine Theory

Course Objective: To practically observe the dynamic behaviors of machines and their components.

Course Outcomes: After taking this course the students should be able to:

ME592.1 Select several type of vibrating systems by using measuring instruments regarding vibration of continuous systems and random vibrations.

ME592.2 Demonstrate methods of balancing of rigid rotors, reciprocating machines, flywheels, planar linkages and instruments.

ME592.3 Define the working principle of gyroscope and governors to apply in future projects

ME592.4 Get practical knowledge on Cam dynamics used in various industrial applications.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME592.1	2	3	2	1	-	-	-	-	3	1	1	1	3	-	3
ME592.2	2	1	2	-	-	-	-	-	3	1	-	-	-	2	-
ME592.3	2	1	3	-	1	-	-	-	2	1	1		1	-	2
ME592.4	2	1	3	-		-	-	-	2	1	-	1	-	-	2
Avg.	2	1.5	2.5	1	1	-	-	-	2.5	1	1	1	2	2	2.33

Course Name: Metrology & Measurement Lab

Course Code: ME 593

Contacts: 3P

Credits: 2

Prerequisite: Metrology & Measurement Theory, Physics.

Course Objective: Hands on experience with various measuring instruments to utilize in industries.

Course Outcomes: Upon completion of this course Students are able to

ME593.1 Demonstrate and use different length measuring instruments like vernier calipers and micrometers.

ME593.2 Explain different angle measuring instrument like universal bevel protractor, sine bar

ME593.3 Formulate some unknown quantity or parameter of engineering interest.

ME593.4 Evaluate the surface quality of a given specimen which is important in all kind of manufacturing.



Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME593.1	1	2	2	-	1	-	-	-	3	1	-	-	-	-	-
ME593.2	1	1	2	-	2	-	-	-	3	1	-	-	-	-	-
ME593.3	1	1	3	-	2	-	-	-	2	1	2	2			1
ME593.4	1	1	3	-	3	-	-	-	2	1	2	1			3
Avg.	1	1.25	2.5	-	2	-	-	-	2.5	1	2	1.5			2

Professional Electives Lab- I

SL.No.	Course Code	Subject Name
1.	ME594 A	REFRIGERATION AND AIR CONDITIONING LAB
2.	ME 594 B	MECHATRONICS LAB
3.	ME 594 C	APPLIED FLUID MECHANICS LAB

Course Name: Refrigeration & Air Conditioning Lab;

Course Code: ME 594A

Contacts: 3P

Credits: 2

Prerequisite: Applied Thermodynamics, Refrigeration & Air Conditioning Theory

Course Objective: To gain hands on practice with refrigerating circuits and develop air-conditioning systems.

Course Outcomes: On successful completion of the course, the student will be able to,

ME594.1 Demonstrate a domestic refrigerator and identify its important components.

ME594.2 Analyze the performance parameters of a vapor compression based refrigeration system

ME594.3 Observe the components of a basic air conditioning setup and operate it to analyze its performance index.

ME594.4 Recognize the components of a thermoelectric refrigeration setup and measure its coefficient of performance useful in future project applications.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME594A.1	1	-	-	-	-	1	-	-	3	2	-	-	-	-	1
ME594A.2	1	-	2	-	-	-	-	-	3	2	1	-	1	1	1
ME594A.3	1	-	2	-	1	1	1	-	3	2	1	1	1	1	2
ME594A.4	1	-	1	-	1	-	2	-	2	2	-	-	2	-	3
Avg.	1	-	1.66	-	1	1	1.5	-	2.75	2	1	1	1.33	1	1.75

Course Name: Mechatronics lab

Course Code: ME594B

Contacts: 3P

Credits: 2



Prerequisite: Fluid Mechanics, Basic Electronics, Mechatronics Theory

Course Objective: To expose students to modern control system using mechanical actuators.

Course Outcomes: On successful completion of the course, the student will be able to

ME594B .1 Describe and demonstrate Mechatronics systems and overview of control systems & actuators.

ME594B .2 Distinguish between various sensors, transducers and actuators and their applications.

ME594B .3 Understand the basic concept of microprocessor and perform simple operations on it.

ME594B .4 Determine various signal conditioning units, amplifiers, logic gates and their role in programmable logic controllers

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME594B.1	1	-	2	-	1	-	-	-	2	1	2	-	-	-	-
ME594B.2	1		2	-	1	-	-	-	-	1	3	1	2	-	1
ME594B.3	1	-	2	-	2	-	-	-	-	1	2	-	-	-	-
ME594B.4	2	-	3	-	1	-	-	-	-	1	3	-	1	-	1
Avg.	1.25	-	2.25	-	1	-	-	-	2	1	2.5	1	1.5	-	1

Course Name: Applied Fluid Mechanics Lab;

Course Code: ME 594C

Contacts: 3P

Credits: 2

Prerequisite: Basic Fluid Mechanics, Applied Fluid Mechanics theory

Course Objective: To expose students towards advanced experiments related to research.

Course Outcomes: On successful completion of the course, the student will be able to,

ME 594C.1. Distinguish the nature of turbulence inside a flow at various flow velocities.

ME 594C.2. Evaluate the Stokes law by experimental investigation.

ME 594C.3. Inspect hydro turbines and analyze their characteristics.

ME 594C.4. Interpret the flow patterns of an open channel flow and understand its practical implications.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME594C.1	3	-	2	-	-	-	-	-	3	1	-	-	-	-	1
ME594C.2	1	-	2	-	-	-	-	-	3	1	-	-	-	-	2
ME594C.3	1	2	2	-	-	-	-	-	2	1	1	-	1	1	
ME594C.4	3	1	3	1	-	-	-	-	3	1	-	-	1	2	2
Avg.	2	1.5	2.25	1	-	-	-	-	2.75	1	1	-	1	1.5	1.66

Course Name: Mini Project-I

Course Code: ME 581

Contacts: 3P

Credits: 2

Course Object: To impart the knowhow of carrying out a project on an engineering problem



Course Outcomes: Upon successful completion of this course, the student will be able to:

ME 581.1 Explore several subject domains to choose a practical problem of interest

ME 581.2 Understand the methods of literature survey to analyze research works

ME 581.3 Analyze, design and evaluate necessary components for the project work

ME 581.4 Assess the utility of the project work and present through written and oral communication

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME581.1	2	2	1	2	-	2	1	-	-	1	1	3		1	2
ME581.2	2	3	2	2	-	1	1	1	-	2	2	3		1	3
ME581.3	1	3	2	2	3	1		2	-	3	3	2		1	2
ME581.4		2	2	2	2	2		1	-	3	3	3		2	2
Avg.	1.6	2.5	1.7	2	2.5	1.5	1	1.3		2.2	2.2	2.7		1.2	2.2

Course Name: Seminar

Course Code: ME 582

Contacts: 3P

Credits: 2

Prerequisite: Basic Communication Skill

Course Objective: Train students to deliver an effective technical presentation in front of any audience.

Course Outcomes: On successful completion of the course, the student will be able to,

1. Prepare a technical seminar presentation in power point format which will be visually effective to reach any number of audiences.
2. Understand the methods of delivering and explaining technical terms through effective diagram selection and white board.
3. Analyze all core areas of Mechanical Engineering for variety of topics and enhance presentation skill by increasing level of detailing.
4. Improve confidence of facing any audience and communicate with them in a disciplined manner, face and reply queries patiently

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME582.1	-	-	-	-	-	2	-	-	1	3	1	-	-	1	2
ME582.2	-	-	-	-	-	2	-	-	1	3	1	1	-	1	2
ME582.3	2	-	-	-	-	2	-	-	1	3	1	-	-	1	3
ME582.4	-	-	-	-	-	2	-	-	2	3	2	1	-	1	3
Avg.	2	-	-	-	-	2	-	-	1.2	3	1.2	1	-	1	2.5



6th Semester CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours/Week				Total Credits
			L	T	P	Total	
A. THEORY:							
PC	ME 601	MACHINING PRINCIPLES & MACHINE TOOLS	3	0	0	3	3
PC	ME 602	DESIGN OF MACHINE ELEMENTS-II	3	0	0	3	3
PC	ME 603	IC ENGINE & GAS TURBINE	3	0	0	3	3
PE-II	ME 604A	ROBOTICS: MECHANICS AND CONTROL	3	0	0	3	3
	ME 604B	COMPOSITE MATERIALS					
	ME 604C	FLUID POWER CONTROL					
OE-I	ME605A	RENEWABLE ENERGY SYSTEMS	3	0	0	3	3
	ME 605B	COMPUTATIONAL FLUID DYNAMICS					
	ME 605C	GAS DYNAMICS AND JET PROPULSION					
Total of Theory			15	0	0	15	15
B. PRACTICAL:							
PC	ME 691	MACHINING & MACHINE TOOLS LAB	0	0	3	3	2
PC	ME 692	DESIGN PRACTICE LAB	0	0	2	2	1
PC	ME 693	I C ENGINE LAB	0	0	3	3	2
PE LAB-II	ME 694 A	ROBOTICS LAB	0	0	3	3	2
	ME 694 B	COMPOSITE MATERIALS LAB					
	ME 694 C	FLUID POWER CONTROL LAB					
Total of Practical			0	0	11	11	7
C. SESSIONAL:							
PROJECT	ME 681	MINI PROJECT-II	0	0	3	3	2
MANDATORY	MC 682	GROUP DISCUSSION	0	0	2	2	0
		TOTAL: Eleven	15	0	16	31	24

Note: Vacational Training to be conducted up to 6th semester and to be evaluated in 7th semester.



THEORY COURSES

Course Name : Machining Principles and Machine Tools
Course Code : ME 601
YEAR : THIRD
SEMESTER : 6th Semester
CONTACT HOURS : 3L
CREDITS : 3

Prerequisite: WORKSHOP TECHNOLOGY, PRIMARY MANUFACTURING PROCESS

Course Objective: The objective of the course is to enlighten student about the detailed mechanism of metal cutting, cutting force, tool life and varying processes of machining.

Course Outcomes: After the completion of this course, the student should be able to:

ME 601.1 Understand the cutting tool geometry, mechanism of chip formation and mechanics of orthogonal cutting and oblique cutting.

ME 601.2 Apply cutting mechanics to metal machining based on cutting force and power consumption.

ME 601.3 Explain the operations of lathe, milling machines, drill press, grinding machines, etc.

ME 601.4 Choose cutting tool materials, tool geometries and appropriate machining processes and conditions for different metals.

Course Articulation Matrix:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME601.1	3	2	1	2	-	-	-	-	-	-	-	1	2	-	2
ME601.2	3	1	1	-	-	-	-	-	-	-	1	1	-	2	1
ME601.3	3	1	2	-	1	-	-	-	-	-	-	-	-	3	-
ME601.4	3	2	3	1	-	-	-	-	-	-	1	3	2	2	3
AVG	3	1.5	1.75	1.5	1	-	-	-	-	-	1	1.66	2	2.33	2

Course Name : Design of machine elements-II
Course Code : ME 602
YEAR : THIRD
SEMESTER : 6th Semester
CONTACT HOURS : 3L
CREDITS : 3

Prerequisite: ENGINEERING GRAPHICS, ENGINEERING MATERIALS

Course Objective: The objective of the course is to enable student for design and analysis of several power transmission devices like shafts, gears, bearings, brakes and clutches

Course Outcomes (CO):

Upon successful completion of this course, the student will be able to:

ME 602.1 Demonstrate the knowledge of basic machine elements to withstand loads and deformations for a given application, while considering additional specifications.

ME 602.2 Formulate and solve engineering problems based on design of spur gears with respect to tooth bending strength and surface strength specifications



ME 602.3 Analyze the design of bearings using design charts and custom software and select appropriate bearings for an application using printed and electronic catalog data.

ME 602.4 Design shafts, brakes and clutches subjected to static or dynamic loads and present their designs orally and in writing.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME 602.1	3	1	2	-	-	2	-	2	-	-	1	2	2	1	
ME 602.2	3	2	3	-	-	1	-	-	-	-	1	2	2	3	2
ME 602.3	3	3	3	1	-	1	-	-	-	-	1	2	1	3	3
ME 602.4	3	3	3	1	-	2	-	1	-	-	1	1	2	3	2
AVG	3	2.25	3	1	-	1.5	-	1.5	-	-	1	1.75	1.75	2.5	2.3

Course Name : I. C. Engines and Gas Turbines
Course Code : ME 603
YEAR : THIRD
SEMESTER : 6th Semester
CONTACT HOURS : 3L
CREDITS : 3

Prerequisite: ENGINEERING THERMODYNAMICS

Course Objective: The course is designed to expose students in the detailed knowledge of components and working of Internal combustion engines along with the assessment of engine performance.

Course Outcomes: Upon completion of this course students will be able to

ME 603.1 Recall the detailed engine nomenclature and characteristics of fuel to analyze its effect on air standard cycles.

ME 603.2 Predict performance and fuel economy trends based on in-depth analysis of fuel injection, mixing and combustion.

ME 603.3 Apply the knowledge of thermal efficiency and emission standards to find optimum cooling & lubrication systems.

ME 603.4 Develop a basic understanding of gas turbine working principle and its performance analysis.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME603.1	3	2	2	2	-	1	1	-	-	-	2	2	2	3	-
ME603.2	2	1	3	2	-	2	2	1	-	-	2	2	-	2	2
ME603.3	3	3	3	3	1	1	1	-	-	-	3	2	1	-	3
ME603.4	2	1	2	2	-	3	3	1	-	-	2	2	1	1	3
AVG	2.5	1.75	2.5	2.25	1	1.75	1.75	1	-	-	2.25	2	1.33	2	2.66



Professional Electives II

Sl. No.	Course Code	Subject Name
1.	ME604 A	ROBOTICS: MECHANICS AND CONTROL
2.	ME 604 B	COMPOSITE MATERIALS
3.	ME 604 C	FLUID POWER CONTROL

Course Name : Robotics: Mechanics And Control
Course Code : ME 604A
YEAR : THIRD
SEMESTER : 6th Semester
CONTACT HOURS : 3L
CREDITS : 3

Prerequisite: Basic Electronics, Primary manufacturing

Course Objective: The course is designed in such a way that students can understand the basic mechanisms of a robot and various end effectors, actuators as well as supporting sensors.

Course Outcomes: Upon completion of this course students will be able to

ME604A.1 Get the knowledge of engine nomenclature, performance parameters and characteristics of different fuels to differentiate several types of I C engine designs.

ME 604A.2 Understand real characteristics of engine performance parameters and several losses due to various operational constraints in the presence of fuel.

ME 604A.3 Predict performance and fuel economy trends with good accuracy, based on an in-depth analysis of the fuel air mixing and combustion process.

ME 604A.4 Develop an understanding of modern injection systems, cooling & lubrication systems and supercharging to optimize the thermal efficiency and emission standards.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME604A.1	3	2	2	2	-	1	1	-	-	-	2	2	2	3	
ME604A.2	2	1	3	2	-	2	2	1	-	-	2	2		2	2
ME604A.3	3	3	3	3	2	1	1	-	-	-	3	2	1		3
ME604A.4	2	1	2	2	3	3	3	1	-	-	2	2	1	1	3
AVG	2.5	2	2.5	2	2.5	2	2.2	1	-	-	2	2	1	2	2

Course Name : Composite Materials
Course Code : ME 604B
YEAR : THIRD
SEMESTER : 6th Semester
CONTACT HOURS : 3L
CREDITS : 3



Prerequisite: ENGINEERING MATERIALS

Course Objective: The course is designed to introduce formation, characteristics and fabrication of composite materials along with various applications.

Course Outcomes: Upon completion of this course students will be able to

ME 604B .1 Know the structure and basic properties of composite and nano-composite materials.

ME 604B .2 Explore and understand the several methods of composite fabrication.

ME 604B .3 Predict the characteristics and performance of composite materials.

ME 604B .4 Apply varying composite materials in automotive, aerospace and other applications.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME604B.1	3	2	2	1	-	-	-	-	-	-	-	-	2	3	-
ME604B.2	2	-	1	2	1	-	-	1	-	-	2	1	1	2	2
ME604B.3	2	2	2	1	1	1	-	-	-	-	1	1	1	2	3
ME604B.4	2	1	2	2	1	1	-	1	-	-	2	3	1	2	3
AVG	2.25	1.6	1.75	1.5	1	1	-	1	-	-	1.6	1.6	1.25	2.25	1.6

Course Name : Fluid Power Control

Course Code : ME 604C

YEAR : THIRD

SEMESTER : 6th Semester

CONTACT HOURS : 3L

CREDITS : 3

Prerequisite: FLUID MECHANICS, BASIC ELECTRONICS

Course Objective: The course exploits the knowledge of several actuators, valves and other control devices running on hydraulic and pneumatic power which finds huge industrial application.

Course Outcomes: Upon completion of this course students will be able to

ME 604C.1 Explain the working principle of hydraulic and pneumatic systems.

ME 604C.2 Understand and analyze the performance of pumps and actuators used in control devices.

ME 604C.3 Apply hydraulic valves in different industrial application.

ME 604C.4 Design and evaluate fluid powered control circuits and express through proper drawing.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
----	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------



ME604C.1	3	2	2	1	-	-	-	-	-	-	-	-	2	3	-
ME604C.2	2	-	1	2	1	-	-	1	-	-	2	1	1	2	2
ME604C.3	2	2	2	1	1	1	-	-	-	-	1	1	1	2	3
ME604C.4	2	1	2	2	1	1	-	1	-	-	2	3	1	2	3
AVG	2.25	1.6	1.7	1.5	1	1	-	1	-	-	1.6	1.6	1.25	2.25	1.6

Open Electives I

SL. No	Course Code	Subject Name
1.	ME605A	RENEWABLE ENERGY SYSTEMS
2.	ME 605B	COMPUTATIONAL FLUID DYNAMICS
3.	ME 605C	GAS DYNAMICS AND JET PROPULSION

Course Name : Renewable Energy Systems

Course Code : ME 605A

YEAR : THIRD

SEMESTER : 6th Semester

TOTAL CONTACT HOURS : 32L

CREDITS : 3

Prerequisite: Thermodynamics, Power Plant Engineering

Course Objective: Aware students about the various renewable energy systems necessary for controlling global warming and create a sustainable development.

Course Outcomes: On successful completion of the course, the learner will be able to

ME605A.1 Compare renewable sources of energy and application of renewable technologies in different areas of country.

ME605A.2 Understand the working principle of various renewable energy technologies and systems like solar, wind, tidal and geothermal resources.

ME605A.3. Explain the knowledge of Storage technologies from renewable energy sources.

ME605A.4. Recognize the need and application to engage in lifelong learning for further development in this field.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME605A.1	2	2	2	2	-	2	3	-	-	-	-	3	2	3	-
ME605A.2	2	-	2	-	-	2	3	-	-	-	-	2	1	2	2
ME605A.3	2	-	1	-	-	2	3	-	-	-	-	2	1	2	3
ME605A.4	-	-	-	-	-	2	3	-	-	-	-	3	1	2	3
AVG	2	2	1.6	2	-	2	3	-	-	-	-	2.5	1.25	2.25	1.6



Course Name : COMPUTATIONAL FLUID DYNAMICS
Course Code : ME 605B
YEAR : THIRD
SEMESTER : 6th Semester
TOTAL CONTACT HOURS : 32L
CREDITS : 3

Prerequisite: Fluid Mechanics, Finite Element Methods

Course Objective: Introduce students to the domain of computational methods used in solving complex engineering problems based on fluid related applications.

Course Outcomes: On successful completion of the course, the learner will be able to

ME 605B.1. Understand the conservation equations and boundary conditions of fluid flow for varying cases.

ME 605B.2. Analyze finite difference and finite volume methods of discretization.

ME 605B.3. Apply several computational solution methods based on finite element analysis.

ME 605B.4. Predict the need and application of new methods in computational fluid dynamics.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME605B.1	3	2	2	2	-	2	3	-	-	-	-	3	2	3	-
ME605B.2	2	-	2	-	-	2	3	-	-	-	-	2	1	2	2
ME605B.3	2	-	1	-	-	2	3	-	-	-	-	2	1	2	3
ME605B.4	-	-	-	-	-	2	3	-	-	-	-	3	1	2	3
AVG	2.33	2	1.66	2	-	2	3	-	-	-	-	2.5	1.25	2.25	2.66

Course Name : GAS DYNAMICS AND JET PROPULSION
Course Code : ME 605C
YEAR : THIRD
SEMESTER : 6th Semester
TOTAL CONTACT HOURS : 32L
CREDITS : 3

Prerequisite: Fluid Mechanics, Applied Fluid Mechanics

Course Objective: Introduce students to the domain of compressible flow and jet propulsion application in several industries.

Course Outcomes: On successful completion of the course, the learner will be able to

ME 605C.1. Understand the basics of compressible flow.

ME 605C.2. Analyze compressible flow characteristics in constant and variable area ducts.

ME 605C.3. Apply the knowledge of shock theories in complex engineering situations.

ME 605C.4. Evaluate jet propulsion techniques applicable in aerospace industries.

Course Articulation Matrix:



CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME605C.1	3	2	2	2	-	2	3	-	-	-	-	3	2	3	-
ME605C.2	2	-	2	-	-	2	3	-	-	-	-	2	1	2	2
ME605C.3	2	-	1	-	-	2	3	-	-	-	-	2	1	2	3
ME605C.4	-	-	-	-	-	2	3	-	-	-	-	3	1	2	3
AVG	2.3	2	1.6	2	-	2	3	-	-	-	-	2.5	1.25	2.25	2.6

Practical Courses

Course Name: Machining & Machine Tools Lab

Course Code: ME 691

Contacts: 3P

Credits: 2

Prerequisite: Workshop, Machining & Machine Tools theory

Course Objective: To expose students into different kind of machine tools and machining processes

Course Outcomes: After the completion of this course, the student should be able to:

ME 691.1 Understand how to Measure cutting forces (P_z and P_x or P_y) in straight turning at different process parameters.

ME 691.2 Measure of average cutting temperature and surface roughness in turning under different speed – feed combinations.

ME 691.3 Examine chip formation (type, color & thickness) in turning mild steel and evaluation of role of variation of cutting velocity and feed on chip reduction coefficient.

ME 691.4 Create a straight toothed spur gear from a cast or forged disc and convert circular rod into square rod.

Course Articulation Matrix:

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME691.1	2	2	1	-		-	-	-	2	1			2	3	
ME691.2	2	2	1	-	1	-	-	-	3	1		1	2	3	2
ME691.3	1	2	1	-	1	-	-	-	3	1		2	1		
ME691.4	1	2	3	-		-	-	-	3	1					1
AVG	1.5	2	1.5	0	0.5	0	0	0	2.7	1	0	0.7	1.6	3	1.5

Course Name : Machine Design Practice
Course Code : ME 692
YEAR : THIRD
SEMESTER : 6th Semester
CONTACT : 2P
CREDITS : 1

Prerequisite: Design of machine elements theory



Course Objective: The objective of the course is to make students practice design and analysis of several power transmission devices like shafts, gears, bearings, brakes and clutches

Course Outcomes (CO):

Upon successful completion of this course, the student will be able to:

ME 692.1 Demonstrate the knowledge of basic machine elements to withstand loads and deformations for a given application, while considering additional specifications.

ME 692.2 Formulate and solve engineering problems based on design of spur gears with respect to tooth bending strength and surface strength specifications

ME 692.3 Analyze the design of bearings using design charts and custom software and select appropriate bearings for an application using printed and electronic catalog data.

ME 692.4 Design shafts, brakes and clutches subjected to static or dynamic loads and present their designs orally and in writing.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME 692.1	3	1	2	-	-	2	-	2	-	-	1	2	2	1	
ME 692.2	3	2	3	-	-	1	-	-	-	-	1	2	2	3	2
ME 692.3	3	3	3	1	-	1	-	-	-	-	1	2	1	3	3
ME 692.4	3	3	3	1	-	2	-	1	-	-	1	1	2	3	2
AVG	3	2.25	2.75	1	-	1.5	-	1.5	-	-	1	1.75	1.75	2.5	2.33

Course Name: INTERNAL COMBUSTION ENGINE LAB (ME 693)

Course Code: ME 693

Contacts: 3P

Credits: 2

Prerequisite: ENGINEERING THERMODYNAMICS, IC ENGINE

Course Objective: To train students with hands on practice of handling I C engines and measuring the performance parameters

Course Outcomes: After the completion of this course, the student should be able to:

ME 693.1. Understand the practical operation of 2 stroke and 4 stroke I.C engines using valve timing diagram

ME 693.2. Analyze the performance of multi cylinder engines with the variation of various performances like load and speed.

ME 693.3. Determine the quality of Engine fuels by analyzing its calorific value.

ME 693.4. Estimate the constituents of combustion products for emission characteristics related to public safety.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
----	------	------	------	------	------	------	------	------	------	-------	-------	-------	-------	-------	-------



ME693.1	1	-	2		-		-	-	2	1	1	1	2	3	2
ME693.2	1	-	3	2	-	1	-	-	3	1	1	2	2	3	2
ME693.3	-	-	2	-	-	2	2	-	3	1	1	3	1	3	1
ME693.4	-	3	2	-	-	2	3	1	3	1	1	3	1	2	3
AVG	1	3	2.25	2	1.6	2.5	1	2.75	1	1	2.25	1.5	1.5	2.75	2

Professional Electives Lab II

SL. No.	Course Code	Subject Name
1.	ME 694 A	ROBOTICS LAB
2.	ME 694 B	COMPOSITE MATERIALS LAB
3.	ME 694 C	FLUID POWER CONTROL LAB

Course Name : ROBOTICS LAB

Course Code : ME 694 A

YEAR : THIRD

SEMESTER : 6th Semester

TOTAL CONTACT HOURS : 3P

CREDITS : 2

Course Objective: To train students with hands on practice of handling robots and program them according to a specific objective.

Course Outcomes: After the completion of this course, the student should be able to:

MME 694A.1. Understand the practical operation of robots and test their degree of freedoms

MME 694A.2. Analyze the gripper performance as per varying objectives.

MME 694A.3. Asses case studies with robots for practical applications.

MME 694A.4. Evaluate the robot using simulation software.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME694A.1	1		2		-	2	1	-	2	1	1	1	2	3	2
ME694A.2	1	1	3	2	-	1	1	-	3	1	1	2	2	3	2
ME694A.3	-		2	-	-	2	2	-	3	1	1	3	1	3	1
ME694A.4	-	3	2	-	-	2	3	1	3	1	1	3	1	2	3
AVG	1	2	2.2	2	-	1.7	1.7	1	2.7	1	1	2.	1.5	2.7	2



Course Name : COMPOSITE MATERIALS LAB
Course Code : ME 694B
YEAR : THIRD
SEMESTER : 6th Semester
TOTAL CONTACT HOURS : 3P
CREDITS : 2

Prerequisite: Composite Materials theory

Course Objective: The course is designed to test the characteristics and fabrication of composite materials.

Course Outcomes: Upon completion of this course students will be able to

ME 694B .1 Know the structure and basic properties of composite and nano-composite materials.

ME 694B .2 Explore and understand the several methods of composite fabrication.

ME 694B .3 Predict the characteristics and performance of composite materials.

ME 694B .4 Apply varying composite materials in automotive, aerospace and other applications.

Course Articulation Matrix:

CO	P O 1	P O 2	PO 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PS O 2	PS O 3
ME694B.1	3	2	2	1	-	-	-	-	-	-	-	-	2	3	-
ME694B.2	2	-	1	2	1	-	-	1	-	-	2	1	1	2	2
ME694B.3	2	2	2	1	1	1	-	-	-	-	1	1	1	2	3
ME694B.4	2	1	2	2	1	1	-	1	-	-	2	3	1	2	3
AVG	2.2	1.6	1.7	1.5	1	1	-	1	-	-	1.6	1.6	1.2	2.2	2.6

Course Name : FLUID POWER CONTROL LAB
Course Code : ME 694C
YEAR : THIRD
SEMESTER : 6th Semester
CONTACT HOURS : 3P
CREDITS : 2

Prerequisite: FLUID MECHANICS, BASIC ELECTRONICS

Course Objective: The course exploits the knowledge of several actuators, valves and other control devices running on hydraulic and pneumatic power which finds huge industrial application.

Course Outcomes: Upon completion of this course students will be able to

ME 694C .1 Explain the working principle of hydraulic and pneumatic systems.

ME 694C .2 Analyze the performance of pumps and actuators used in control devices.

ME 694C .3 Apply hydraulic valves in different industrial application.

ME 694C .4 Design and evaluate fluid powered control circuits and express through proper drawing.

Course Articulation Matrix:



CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME694C.1	2	1	2		-	-	-	-	-	-	-	-	2	3	-
ME694C.2	2	-	1		1	-	-	1	-	-	2	1	1	2	2
ME694C.3	2	1	2		1		-	-	-	-	1	1	1	2	3
ME694C.4	2	1	2		1		-	1	-	-	2	3	1	2	3
AVG	2	1	1.75		1			1			1.6	1.6	1.25	2.25	2.6

SESSIONAL

Mini Project-II

ME 681

Contacts: 3P

Credits: 2

Course Outcomes: Upon successful completion of this course, the student will be able to:

ME 681.1 Explore several subject domains to choose a practical problem of interest

ME 681.2 Understand the methods of literature survey to analyze research works

ME 681.3 Analyze, design and evaluate necessary components for the project work

ME 681.4 Assess the utility of the project work and present through written and oral communication

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME681.1	2	2	1	2	-	2	1	-	-	1	1	3	2	1	2
ME681.2	2	3	2	2	-	1	1	1	-	2	2	3	2	1	3
ME681.3	1	3	2	2	3	1	-	2	-	3	3	2	2	1	2
ME681.4	-	2	2	2	2	2	-	1	-	3	3	3	2	2	2
Avg.	1.6	2.5	1.7	2	2.5	1.5	1	1.3	-	2.25	2.25	2.7	2	1.25	2.25

Course Name: Group Discussion

Course Code: ME682

Contact Hours: 2P

Credit: 0

Course Outcomes: Upon successful completion of this course, the student will be able to:

ME682.1 Communicate effectively in an interview

ME682.2 Grow leadership and negotiation skills.

ME682.3 Learn discipline, body language, positive attitude and ethics to follow whole life.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME682.1	-	-	-	-	-	1	-	-	-	3	2	2	-	1	2
ME682.2	-	-	-	-	-	1	-	-	-	3	2	2	-	1	3
ME682.3	-	-	-	-		1	-	-	-	3	2	2	-	1	3
Avg.	-	-	-	-	-	1	-	-	-	3	2	2	-	1	2.66



7th SEMESTER CURRICULUM

Subject Type	Subject Code	Subject Name	Contact Hours/Week				Total Credits
			L	T	P	Total	
A. THEORY:							
PC	ME 701	POWER PLANT ENGINEERING	3	0	0	3	3
PC	ME 702	ADVANCED MANUFACTURING TECHNOLOGY	3	0	0	3	3
PE-III	ME 703 A	ADVANCED WELDING TECHNOLOGY	3	0	0	3	3
	ME 703 B	BIOMECHANICS & BIOMATERIALS					
	ME 703 C	FINITE ELEMENT METHOD					
PE-IV	ME 704 A	TRIBOLOGY	3	0	0	3	3
	ME 704 B	OPERATIONS RESEARCH					
	ME 704 C	MATERIALS HANDLING					
OE-II	ME 705 A	ENERGY CONSERVATION & MANAGEMENT	3	0	0	3	3
	ME 705 B	QUALITY & RELIABILITY ENGINEERING					
	ME 705 C	HYDRO, WIND AND WAVE POWER					
Total of Theory			15	0	0	15	15
B. PRACTICAL:							
PC	ME 791	ADVANCED MANUFACTURING LAB	0	0	2	2	1
PE-III lab	ME 793 A	ADVANCED WELDING LAB	0	0	2	2	1
	ME 793 B	BIOMECHANICS & BIOMATERIALS LAB					
	ME 793 C	FINITE ELEMENT METHOD LAB					
Total of Practical			0	0	4	4	2
C. SESSIONAL:							
PW	ME 781	PROJECT- I	0	0	6	6	3
PW	ME 782	DESIGN OF MECHANICAL SYSTEM	0	0	3	3	2
PW	ME 783	VIVA-VOCE ON VACATIONAL TRAINING	0	0	0	0	2
Total of Sessional						9	7
Total of Semester			15	0	13	28	24



SYLLABUS OF 7TH SEMESTER COURSES

Theory Courses

Course Name: Power Plant Engineering

Course Code: ME 701

Contact Hours: 34L

Credit: 3

Course Objective: To aware students about all the details of power generation from conventional and nonconventional resources and make them

Course Outcomes (CO): Upon successful completion of this course, the student will be able to:

ME 701.1. Analyze performance of a variety of steam based thermal power cycles and understand the economics of a power plant.

ME 701.2. Get detailed knowledge about part and parcel of a steam generator and design the mountings and accessories by analytical investigations.

ME 701.3. Propose coal handling, air handling, ash handling and firing methods in a thermal power plant and involve in further research areas for modernization.

ME 701.4. Analyze the working of steam nozzles and variety of turbines to carry out design based project works and solution of industrial problems.

Course Articulation Matrix:

CO	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PS O 1	PS O 2	PS O 3
ME701.1	3	3	2	1	-	3	2	1	-	-	3	1	3	1	1
ME701.2	2	2	3	-	-	-	2	-	1	-	2	2	3	2	2
ME701.3	2	1	2	1	-	1	2	-	-	-	1	1	2	3	2
ME701.4	3	3	3	2	-	-	1	2	-	-	2	1	3	3	1
Avg.	2.5	2.2	2.5	1.3	-	2	1.7	1.5	1	-	2	1.2	2.7	2.2	1.5

Course Name: Advanced Manufacturing Technology

Course Code: ME 702

Contact Hours: 34L

Credit: 3

Course Outcomes: After successful completion of the course, the student would be able to

ME 702.1 Understand the principle of working, mechanism of metal removal in the nonconventional machining processes like AJM, WJM, and USM.

ME 702.2 Evaluate the process parameters involved in machining process and analyze their effect on surface finish achieved in USM, ECM, and EDM.

ME 702.3 Understand the principles of Laser Beam Machining and an introduction to hybrid machining

ME 702.4 Get an overview of rapid prototyping and use of 3D printing.

Course Articulation Matrix:



CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME702.1	3	-	2	-	2	-	3	-	-	-	1	2	-	1	2
ME702.2	3	2	2	-	2	-	2	-	-	-	2	2	2	2	3
ME702.3	2	1	1	-	2	-	2	-	-	-	1	1	2	2	3
ME702.4	2	2	2	-	3	-	2	-	-	-	2	2	2	3	3
Avg	2.5	1.6	1.7		1.7		1.7				1.5	1.7	2	2	2.7

Professional Electives III

SL. No.	Course Code	Subject Name
1	ME 703 A	ADVANCED WELDING TECHNOLOGY
2	ME 703 B	BIOMECHANICS & BIOMATERIALS
3	ME 703 C	FINITE ELEMENT METHOD

Course Name: Advanced Welding Technology

Course Code: ME 703A

Contact Hours: 32L

Credit: 3

Course Outcomes: Upon completion of this course, the student will be able to achieve:

ME 703A.1 Deeper knowledge of welding materials and technology of welding.

ME 703A.2 Deeper knowledge of different metals and their properties in welded constructions

ME 703A.3 Knowledge of quality techniques at production by welding

ME 703A.4 Knowledge of current computer systems and cost for welding operations

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME703A.1	3	-	1	-	-	-	-	-	-	-	2	1	-	-	-
ME703A.2	2	2	2	-	-	-	-	-	-	-	2	1	-	3	1
ME703A.3	3	-	2	-	-	-	-	1	-	-	2	-	1	-	-
ME703A.4	2	1	2	-	-	1	-	-	-	-	3	1	1	-	-
Avg	2.5	2.5	1.75	-	-	1	-	1	-	-	2.25	1	1	3	1

Course Name: Biomechanics & Biomaterials

Course Code: ME 703B

Contact Hours: 32L

Credit: 3

Course Objectives: The objective of the course is to make student aware about the application of mechanics and advanced materials for human welfare in the biological perspective.

Course Outcomes: After completion of the course student will be able to

ME703B.1 Recall the fundamentals of biomechanics and its relation with human motion.



ME703B.2 Apply a broad knowledge of different types of biomaterials including metals, polymers, ceramics and composites and their use in typical biomedical devices and clinical applications..

ME703B.3 Design an implant using fundamental concept and modern engineering tools to develop hard tissue and soft tissue replacement materials by suitable material selection.

ME703B.4. Analyze the design of various biocompatible implants and artificial organ to develop and improve Health Care Service to serve mankind and society.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME703B.1	3	-	1	-	-	-	-	-	-	-	2	1	-	-	-
ME703B.2	2	2	2	-	-	-	-	-	-	-	2	1		3	1
ME703B.3	3	-	-	-	-	2	-	-	1	-	2	2	1	-	2
ME703B.4	2		2	-	-		2	1	1	-	3	3	1	-	-
Avg	2.5	2	1.6	-	-	2	2	1	1	-	2.25	1.75	1	3	1.5

Course Name: Finite Element Method

Course Code: ME 703 C

Contact Hours: 3L

Credit: 3

Course Outcomes: Upon successful completion of this course, students will be able to

ME 703C.1 Understand of the fundamental theory of the FEA method.

ME 703C.2 Develop the ability to generate the governing FE equations for systems governed by partial differential equations.

ME 703C.3 Apply the basic finite element methods for structural applications using truss, beam frame, and plane elements.

ME 703C.4 Analyze of the FE method and comparing result with FEA package like-Ansys.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
ME703 C.1	3	2	2	2	-	2	3	-	-	-	-	3	2	3	-
ME703 C.2	2	-	2	-	-	2	3	-	-	-	-	2	1	2	2
ME703 C.3	2	-	1	-	-	2	3	-	-	-	-	2	1	2	3
ME703 C.4	-	-		-	-	2	3	-	-	-	-	3	1	2	3
Avg.	2.3	2	1.6	2	0	2	3	0	0	0	0	2.5	1.2	2.2	2.6



Professional Electives IV

Sl. No.	Course Code	Subject Name
1	ME 704 A	TRIBOLOGY
2	ME 704 B	OPERATIONS RESEARCH
3	ME 704 C	MATERIALS HANDLING

Course Name: TRIBOLOGY

Course Code: ME 704A

Contact Hours: 32L

Credit: 3

Course Outcomes: Upon successful completion of this course, students will be able

ME 704A.1. to become familiar with mathematical tools used to analyze Tribological processes.

ME 704A.2. to have awareness of Tribological issues in the design of machine components, such as rolling element bearings, journal bearings, thrust bearings, seals, and braking systems.

ME 704A.3. to become familiar with common anti-friction and anti-wear components.

ME 704A.4. to design a Tribological system for optimal performance.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME704A.1	3	2	2	1	-	-	-	-	-	-	-	1	1	-	-
ME704A.2	2	1	1	1	-	-	-	-	-	-	-	1	1	-	-
ME704A.3	3	2	1	2	-	-	-	-	-	-	-	1	2	-	-
ME704A.4	2	1	2	1	-	-	-	-	-	-	-	1	2	-	-
Avrg.	2.5	1.5	1.5	1.3	-	-	-	-	-	-	-	1	1.5	-	-

Course Name: Operations Research

Course Code: ME 704 B

Contact Hours: 32L

Credit: 3

Course Outcomes: On successful completion of the course, the learner will be able to:

CODE	DESCRIPTION
ME704B.1	Understand the characteristics of different types of decision-making environments to formulate and solve a real-world problem as a mathematical programming model.
ME704 B.2	Understand the theoretical workings of appropriate decision making approaches and tools to identify the optimal strategy in competitive world.
ME704 B.3	Solve network models like the shortest path, minimum spanning tree, and maximum flow problems
ME704 B.4	Create Model of a dynamic system as a queuing model and compute important performance measures.

Course Articulation Matrix:

POs COs	P O 1	P O 2	P O 3	P O 4	P O 5	P O 6	P O 7	P O 8	P O 9	P O 10	P O 11	P O 12	PSO 1	PSO 2	PSO 3
ME704B.	3	3	3	2	-	-	-	-	-	-	-	1	1	-	-



1															
ME704 B.2	3	3	3	2	-	-	-	-	-	-	-	1	-	1	
ME704 B.3	2	2	2	1	-	-	-	-	-	-	1	1	1	-	1
ME704 B.4	2	-	2	2	-	3	1	1	3	2	3	2	-	-	2
Avg	2.5	2	2.5	1.7	0	3	1	1	3	2	2	1.2	1	1	1.5

Course Name: Materials Handling

Course Code: ME 704 C

Contact Hours: 32L

Credit: 3

Course Outcomes: Upon completion of the subject, students will be able to

ME 704C.1 Understand the basic roles of the different materials handling equipment.

ME 704C.2 Recognize the importance of safety issues in the areas of warehouse and material handling.

ME 704C.3 Evaluate their abilities in Key areas such as Purchase Management, Inventory Control, Logistics, Warehousing and Human Resource Management.

ME704C.4 Discuss legal aspects of business, employment laws and to deal with public and government.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O 1	PS O 2	PS O 3
ME704C.1	3	-	2	-	-	1	-	-	-	-	-	1	-	-	-
ME704C.2	3	-	1	-	-	1	-	-	-	-	-	1	-	-	-
ME704C.3	2	1	-	-	-	1	-	-	-	-	-	3	-	2	-
ME704C.4	2	-	-	-	-	1	-	-	-	-	-	3	-	-	2
AVG	2.5	1	1.5	-	-	1	-	-	-	-	-	2	-	2	2

Other Electives II

Sl. No	Course Code	Subject Name
1.	ME 705 A	ENERGY CONSERVATION & MANAGEMENT
2.	ME 705 B	QUALITY & RELIABILITY ENGINEERING
3.	ME 705 C	HYDRO, WIND AND WAVE POWER

Course Name: Energy Conservation & Management

Course Code: ME705 A

Contact Hours: 34L

Credit: 3

Course Outcomes: Upon successful completion of this course, students will be able to

ME705A.1: Obtain knowledge about energy conservation policy, regulations and business practices



ME705A.2: Design to improve the thermal efficiency by designing suitable systems for heat recovery and co-generation

ME705A.3: Analyze the energy audit methods learnt to identify the areas deserving tighter control to save energy expenditure

ME705A.4: Evaluate the cost- benefit analysis of various investment alternatives for meeting the energy needs of the organization

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
ME705 A.1	3	2	-	2	1	-	2	3		2	-	-	-	-	-
ME705 A.2	3	1	2	-	-	1	2	1	1	1	-	-	-	2	3
ME705 A.3	2	2	-	2	1	-	2	2	-	1	-	-	-	-	-
ME705 A.4	3	-	2	-	-	2	-	3	-	2	-	-	-	-	3
AVG	2.7	1.6	2	2	1	1.5	2	2.2	1	1.5	-	-	-	2	3

Course Name: Quality & Reliability Engineering

Course Code: ME 705B

Contact Hours: 34L

Credit: 3

Prerequisites: General knowledge of industries and workflow

Course Outcomes: Upon successful completion of this course, students will be able to

ME 705B 1: Obtain knowledge about product quality and

ME 705B 2: Understand total quality management tools and techniques

ME 705B 3: Analyze process control parameters and quality management systems

ME 705B 4: Assess risk and reliability of a production system

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME 705B.1	3	2	-	2	1	-	2	3	-	2	-	-	-	-	-
ME 705B.2	3	1	2	-	-	1	2	1	1	1	-	-	2	2	3
ME 705B.3	2	2	-	2	1	-	2	2	-	2	-	-	-	2	2
ME 705B.4	3	-	2	-	-	2	-	3	-	2	-	-	-	-	-
Avg.	2.75	1.66	2	2	1	1.5	2	2.25	1	1.5	-	-	2	2	2.5

Course Name: HYDRO, WIND AND WAVE POWER

Course Code: ME 705 C

Contact Hours: 3L

Credit: 3

Course Outcomes: On successful completion of the course, the learner will be able to



- ME 705 C.1. Name different students about renewable sources of energy
ME 705 C.2. Understand the working principle of hydro wind and wave based energy resources.
ME 705 C.3. Evaluate the efficiency of hydro, wind and wave power plants
ME 705 C.4. Apply the expertise of hydro, wind and wave power to realtime project works and industries.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME705C.1	2	2	2	2	-	2	3	-	-	-	-	3	2	3	-
ME705C.2	2	-	2	-	-	2	3	-	-	-	-	2	1	2	2
ME705C.3	2	-	1	-	-	2	3	-	-	-	-	2	1	2	3
ME705C.4	-	-	-	-	-	2	3	-	-	-	-	3	1	2	3
AVG	2	2	1.3	2	-	2	3	-	-	-	-	2	1.25	2.25	1.6

Practical Courses

Course Name: Advanced Manufacturing Technology Laboratory

Course Code: ME791

Weekly Contact Hours: 3P

Credit: 2

Course Outcomes: After successful completion of the course, the student would be able to

ME791.1 Program a CNC turning or milling machine for preparing a job.

ME791.2 Evaluate the process parameters involved in CNC machining

ME791.3 Analyze the principles of Robot programming and carryout hands on practice

ME791.4 Elaborate any nonconventional machining process and 3D printing.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME 702.1	3	-	2	-	2	-	3	-	-	-	1	2	3	-	-
ME 702.2	3	2	2	-	2	-	2	-	-	-	2	2	2	-	-
ME 702.3	2	1	1	-	2	-	2	-	-	-	1	1	-	3	3
ME 702.4	2	2	2	-	3	-	2	-	-	-	2	2	3	2	-
Avg	2.5	1.66	1.75	-	2.25	-	2.25	-	-	-	1.5	1.75	2.66	2.5	3

Professional Electives Lab III

SL.No.	Course Code	Subject Name
1.	ME 793 A	ADVANCED WELDING LAB
2.	ME 793 B	BIOMECHANICS & BIOMATERIALS LAB
3.	ME 793 C	FINITE ELEMENT METHOD LAB



Course Name: ADVANCED WELDING LAB

Course Code: ME 793A

Weekly Contact Hours: 2P

Credit: 1

Course Outcomes: Upon completion of this course, the student will be able to:

ME 793A.1 Discover practice of welding materials in MIC and TIG.

ME 793A.2 Inspect different metals and their properties in welded constructions

ME 793A .3 Determine quality techniques at production by welding

ME 793A.4 practice of resistance welding

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME793A.1	1	-	1	-	-	-	-	-	-	-	2	2	-	1	1
ME793A.2	2	1	2	-	1	-	-	-	-	-	2	2	-	2	1
ME793A.3	1	-	2	-	1	-	-	-	-	-	2	2	1		1
ME793A.4	1	1	2	-	-	1	-	-	-	-	3	2	1	1	1
Avg	1.25	1	1.7	-	1	1	-	-	-	-	2.2	2	1	1.3	1

Course Name: BIOMECHANICS AND BIOMATERIALS LAB

Course Code: ME793B

Weekly Contact Hours: 2P

Credit: 1

Course Outcomes: After completion of the course student will be able to

ME793B.1 Apply the fundamentals of biomechanics and its relation with human motion.

ME793B.2 Identify different types of biomaterials including metals, polymers, ceramics and composites.

ME793B.3 Design an implant using modern engineering tools to develop hard tissue and soft tissue replacement materials by suitable material selection.

ME793B.4. Analyze the design of various biocompatible implants and artificial organ to develop and improve Health Care Service to serve mankind and society.

Course Name: FINITE ELEMENT METHOD LAB

Course Code: ME 793C

Weekly Contact Hours: 2P

Credit: 1

Course Outcomes: Upon successful completion of this course, students will be able to

1) Understand of the fundamental theory of the FEA.

2) Generate the governing FE equations for systems governed by partial differential equations.

3) Use the finite element methods for structural applications using truss, beam frame, and plane elements.

4) Analyze of the FE method and compare result with FEA package like-Ansys.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
ME793 C.1	2	-	2	2	-	-	-	1	1	-	2	1	-	-	-



ME793 C.2	2	3	-	3	2	-	-	1	1	-	2	1	-	2	3
ME793 C.3	3	3	2	2	2	-	-	1	1	-	2	3	-	-	3
ME793 C.4	-	-	3	1	3	-	-	1	1	-	2	3	2	2	3
Avg	2.3	3	2.3	2	2.3	-	-	1	1	-	2	2	2	2	3

SESSIONAL COURSES

Course Name: Project (Part I)

Course Code: ME781

Contact Hours: 6P

Credit: 3

Course Outcomes:

Upon successful completion of this course, the student will be able to:

1. Explore several subject domains to choose a practical problem of interest
2. Understand the methods of literature survey to analyze research works
3. Analyze, design and evaluate necessary components for the project work
4. Assess the utility of the project work and present through written and oral communication

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME781.1	3	2	1	2	-	2	1	-	-	1	1	3	1	1	2
ME781.2	3	3	2	2	-	1	1	1	-	2	3	3	2	2	3
ME781.3	3	2	2	2	3	2	-	1	-	2	2	2	2	1	2
ME781.4	2	2	2	2	2	2	-	1	-	3	3	3	1	2	2
Avg	3	2.2	2.6	2	2.5	1.7	1	1	-	2	2.25	2.7	1.5	1.5	2.25

Course Name: Design of a Mechanical System

Course Code: ME782

Contact Hours: 3P

Credit: 2

Course Outcomes: Upon successful completion of this course, the student will be able to:

ME782.1 Explore domains of engineering problems to choose one of interest

ME782.2 Understand the working principle of the related component or instrument to be designed

ME782.3 Analyze, design and evaluate necessary components for the work

ME782.4 Assess the utility of the project work and present through written and oral communication

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME782.1	2	2	1	2	-	2	1	-	-	1	1	3	-	1	2
ME782.2	2	3	2	2	-	1	1	1	-	2	2	3	-	1	3
ME782.3	1	3	2	2	3	1	2	-	-	3	3	2	-	1	2



ME782.4	-	2	2	2	2	2	-	1	-	3	3	3	-	2	2
Avg	1.6	2.5	1.7	2	2.5	1.5	1	1.3		2.25	2.25	2.7	-	1.25	2.25

Course Name: Viva Voce on Vocational Training.

Course Code: ME783

Contact Hours: 0

Credit: 2

Course Outcomes: Upon successful completion of this course, the student will be able to:

ME782.1 Explore practical works in a particular industry and experience domains of engineering interest

ME782.2 Understand the workflow and management principles of an Industry

ME782.3 Engage in some live project to learn the modern technologies

ME782.4 Assess the knowledge and preparation required to get placed in a industry

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME783.1	1	1	-	-	1	3	1	-	2	1	2	3	1	3	3
ME783.2	2	1	-	-	1	3	1	1	2	2	3	3	1	3	3
ME783.3	3	1	2	2	3	3	1	1	2	2	2	3	1	3	3
ME783.4	2	1	-	-	2	3	1	1	2	3	3	3	1	3	3
Avg	2	1	2	2	1.5	3	1	1	2	2	2.5	3	1	3	3



8th SEMESTER CURRICULUM

	Subject Code	Subject Name	Contact Hours/Week				Total Credits
			L	T	P	Total	
A. THEORY:							
HU	HU 804	PRICIPLES OF MANAGEMANT	2	0	0	2	2
PE-V	ME 802A	AUTOMOBILE ENGINEERING	3	0	0	3	3
	ME 802B	CAD/CAM					
	ME 802C	AUTOMATION & CONTROL					
OE-III	ME 803A	TURBO MACHINERY	2	0	0	2	2
	ME 803B	MAINTENANCE ENGINEERING					
	ME 803C	NUMERICAL HEAT TRANSFER					
OE-IV	ME 804A	SAFETY & OCCUPATIONAL HEALTH	2	0	0	2	2
	ME 804B	NUCLEAR POWER GENERATION AND SUPPLY					
	ME 804C	FRACTURE MECHANICS					
Total of Theory			9	0	0	9	9
B. SESSIONAL:							
PW	ME 881	PROJECT II	0	0	12	12	6
PW	ME 882	GRAND VIVA	0	0	0	0	2
Total of Semester			9	0	12	21	17

THEORY COURSES

Course Name: PRINCIPLES OF MANAGEMANT

Course Code: HU 804

Contact Hours: 2L

Credit: 2

Course Objective: To make students aware about management principles applicable in industries.

Course Outcome:

Module No.	Syllabus	Contact Hrs.
1	Introduction : System concept of production; Product life cycle; Types and characteristics of production system; Productivity; Process and product focused organization structures; Management decisions - strategic, tactical and operational	3
2	Forecasting : Patterns of a time series - trend , cyclical, seasonal and irregular; Forecasting techniques : moving average, simple exponential smoothing, linear regression; Forecasting a time series with trend and seasonal component.	4
3	Materials Management and Inventory Control : Components of materials management; Inventory control : EOQ model, Economic lot size model, Inventory model with planned shortages, Quantity discounts for EOQ	4



	model; ABC analysis; Just-in-time inventory management.	
4	Materials Requirement Planning : MRP concept – bill of materials (BOM), master production schedule; MRP calculations.	3
5	Machine Scheduling : Concept of Single machine scheduling – shortest processing time (SPT) rule to minimize mean flow time, Earliest due date (EDD) rule to minimize maximum lateness, Total tardiness minimizing model; Minimizing makespan with identical parallel machines; Johnson's rule for 2 and 3 machines scheduling.	3
6	Project Scheduling : Activity analysis; Network construction; critical path method (CPM); Crashing of project network.	3
7	Quality Assurance : Meaning of Quality; Quality assurance system; choice of process and quality; Inspection and control of quality; Maintenance function & quality; Process control charts : x-chart and Rchart, p-chart and c-chart; Acceptance sampling : Operating characteristic (O.C) curve, Single sampling plan, Double sampling plan, Acceptance sampling by variables; concept of Six Sigma.	4

Books Recommended :

1. Buffa and Sarin, Modern Production/Operations Management, John Wiley & Sons.
2. R. Panneerselvam, Production and Operations Management, PHI.
3. Russell & Taylor, Operations Management, PHI.
4. Adam and Ebert, Production and Operations Management, PHI.
5. Production & Operations Management by Starr, Cenage Learning India.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
HU804 .1	3	2	3	3	3	1	3	1	3	1	1	2	2	3	
HU804 .2	3	2	3	2	3	1	2	1	3	1	1	2		2	2
HU804 .3	3	3	3	2	3	1	1	1	3	1	1	2	1		3
HU804 .4	3	2	3	2	3	1	1	1	3	1	1	2	1	1	3
Avg.	3	2.2	3	2.2	3	1	1.7	1	3	1	1	2	1	1.5	2

Professional Electives IV

Sl. No.	Course Code	Subject Name
1.	ME 802A	AUTOMOBILE ENGINEERING
2.	ME 802B	CAD/CAM
3.	ME 802C	AUTOMATION & CONTROL

Course Name: Automobile Engineering

Course Code: ME 802A

Contact Hours: 34L

Credit: 3

Course Outcomes: After taking this course the students should be able to

ME 802A.1 Calculate dynamic wheel loads as influenced by accelerations, grades, aerodynamics and towed vehicles



ME 802A.2 Understand power train function and the translation of torques and speeds throughout

ME 802A.3 Design and proportion a brake system and Understand the fundamentals of ride excitation sources and how to tune vehicle responses for best ride

ME 802A.4 Knowledge of various suspension types and methods of analysis to determine their essential properties

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
ME802 A.1	3	2	1	1	-	-	2	2	-	-	1	2	-	1	-
ME802 A.2	3	3	2	2	-	-	2	1	-	-	1	1	1	3	2
ME802 A.3	2	3	1	2	-	-	1	2	-	-	2	2	1	2	2
ME802 A.4	2	1	2	1	-	-	2	2	-	-	1	1	1	2	2
AVG	2.5	2.2	1.5	1.5	-	-	1.7	1.7	-	-	1.25	1.5	1	2	2

Course Name: CAD/CAM

Course Code: ME802B

Contact Hours: 34L

Credit: 3

Course Outcome: At the end of the course the students shall be able to:

ME802B.1 Describe the mathematical basis of representing geometric entities like points, lines, parametric curves, surfaces, solid, and the technique of transformation using transformation matrix.

ME802B.2 Carry out analysis of stress in intricate geometric parts by FEM and describe the use of GT and CAPP for the product development.

ME802B.3 Describe the various types of tool and work handling systems and their application.

ME802B.4 Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.

Course Articulation Matrix:

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME802B.1	3	1	1		2	-	-	-	-	-	3	-	1	-	-
ME802B.2	3	3	2	1	3	-	-	-	-	-	1	1	2	-	2
ME802B.3	2	-	1	2	3	-	-	-	-	-	2	-	3	2	-
ME802B.4	2	-	2		3	-	-	-	-	-	2	2	2	-	2
Avg	2.5	2	1.5	1.5	3	-	-	-	-	-	2	1.5	2	2	2



Course Name: AUTOMATION & CONTROL

Course Code: ME 802C

Contact Hours: 3L

Credit: 3

Course Outcome: At the end of the course the students shall be able to:

ME 802C.1 Discover the basics if a control system and explore its types

ME 802C.2 Analyze the mathematical models of dynamics systems and understand error analysis

ME 802C.3 Carry out time domain analysis, frequency domain analysis to assess stability of a system

ME 802C.4 Measure control system performance indicators.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME802C.1	3	1	1		2	2	1	1	-	-	3	-	1	-	-
ME802C.2	3	3	2	1	3	2	1	1	-	-	1	1	2	-	2
ME802C.3	2	-	1	2	3	2	1	1	-	-	2	-	3	2	-
ME802C.4	1	-	2		3	2	1	1	-	-	2	2	-	-	2
Avg	2.2	2	1.5	1.5	3	2	1	1	-	-	2	1.5	2.3	2	2

Open Electives III

Sl. No	Course Code	Subject Name
1.	ME 803A	TURBO MACHINERY
2.	ME 803B	MAINTENANCE ENGINEERING
3.	ME 803C	NUMERICAL HEAT TRANSFER

Course Name: TURBO MACHINERY

Course Code: ME 803A

Contact Hours: 32L

Credit: 3

Prerequisite: Fluid Mechanics and Fluid machinery

Course Outcomes: Upon successful completion of this course, students will be able to achieve:

ME 803A.1. Basic knowledge about rotary machines, nozzle, diffuser etc.

ME 803A.2. Understand about the calculation of efficiency, power etc. of steam turbines and hydraulic turbine.

ME 803A.3. Evaluate of efficiency, power required etc. of pumps and compressor

ME 803A.4. Design of various incompressible and compressible flow machines.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME803A.1	3	-	-	-	-	2	1	-	-	-	-	3	-	1	-
ME803A.2	3	2	-	-	-	-	-	-	1	-	-	3	-	1	2



ME803A.3	3	2	-	-	-	-	-	-	2	-	-	3	1	-	-
ME803A.4	3	3	3	3	1	2	1	-	1	-	2	3	-	2	2
Avg.	3	2.6	3	3	1	2	1	-	1.3	-	2	3	1	1.3	2

Course Name: Maintenance Engineering

Course Code: ME803B

Contact Hours: 34L

Credit: 3

Prerequisite: Strength of Material, Machine Design, Measurement and Instrumentation

Course Outcomes: Upon successful completion of this course, students will be able to achieve:

ME803B 1. Basic knowledge about types and procedure of maintenance, instruments and tools.

ME803B 2. Understand organizational and economic structure of maintenance.

ME803B 3. Evaluate of performance of tools associated with maintenance and lubrication.

ME803B 4. Design maintenance tools for various applications like bearings, drives, pumps, piping etc.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME803B.1	3	1	1	-	-	-	-	-	-	-	-	2	-	-	-
ME803B.2	2	2	1	1	-	-	-	-	1	-	-	3	-	-	2
ME803B.3	1	2	2	1	2	-	-	-	2	-	-	3	-	2	-
ME803B.4	1	3	3	2	1	2	1	-	1	-	2	3	-	-	3
Avg	1.7	2	1.7	1.3	1.5	2	1	-	1.3	-	2	2.7	-	2	3

Course Name: NUMERICAL HEAT TRANSFER

Course Code: ME 803C

Contact Hours: 34L

Credit: 3

Prerequisite: Strength of Material, Machine Design, Measurement and Instrumentation

Course Outcomes: Upon successful completion of this course, students will be able to:

ME 803C.1. Name the discretization techniques used to analyze fluid flow associated with heat transfer.

ME 803C.2. Understand modeling conduction and convection problems using finite volume method and central difference schemes.

ME 803C.3. Analyze effect of turbulence and multi phase conditions.

ME 803C.4. Solve practical problems using software with proper understanding of grid structure and boundary conditions

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME803C.1	3	2	1	1	-	-	-	-	-	-	1	-	-	-	-
ME803C.2	2	2	1	1	-	-	-	-	1	-	2	-	-	2	2
ME803C.3	2	2	2	1	-	-	-	-	1	-	2	-	2	-	-



ME803C.4	1	2	3	2	3	-	-	-	1	-	1	2	3	-	2
Avg	2	2	1.7	1.25	3	-	-	-	1	-	1.5	2	2.5	2	2

Other Electives IV

Sl. No	Course Code	Subject Name
1.	ME 804A	SAFETY & OCCUPATIONAL HEALTH
2.	ME 804B	NUCLEAR POWER GENERATION AND SUPPLY
3.	ME 804C	FRACTURE MECHANICS

Course Name: Safety & Occupational Health

Course Code: ME 804A

Contact Hours: 32L

Credit: 3

Prerequisite: Strength of Material, Machine Design, Measurement and Instrumentation

Course Outcomes: Upon successful completion of this course, students will be able to achieve:

ME 804A.1. Primary knowledge of industrial and occupational safety and accident prevention

ME 804A.2. Understand occupational health and safety rules and regulations.

ME 804A.3. Analyze the safety management issues along with accident compensation acts.

ME 804A.4. Manage real life problems in the industries related to accident prevention and safety.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME804A.1	1	-	1	-	-	3	1	-	-	-	1	1	-	-	-
ME804A.2	2	-	-	-	-	3	1	-	-	-	2	2	-	-	2
ME804A.3	2	-	-	-	-	3	-	-	-	-	2	2	-	-	-
ME804A.4	1	-	1	-	-	3	-	-	-	-	1	2	-	-	3
Avg.	1.5	-	1	-	-	3	1	-	-	-	1.5	1.75	-	-	2.5

Course Name: NUCLEAR POWER GENERATION AND SUPPLY

Course Code: ME 804 B

Contact Hours: 34L

Credit: 3

Prerequisite: Physics, Chemistry, Heat Transfer, Power plant Engineering,

Course Outcomes: Upon successful completion of this course, students will be able to achieve:

ME 804B 1. Detailed knowledge of nuclear reactor types and associated systems

ME 804B 2. Analyze variety of nuclear power plants based on fission and fusion.

ME 804B 3. Evaluate the safety assessments and waste management.

ME 804B 4. Design and simulate equivalent conditions for practical problem solving.

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME804B.1	3	2	2	1	-	1	1	-	-	-	1	1	-	-	2
ME804B.2	2	1	1	2	-	2	1	-	-	-	1	2	-	2	2
ME804B.3	2	2	3	1	-	3	2	-	-	-	1	2	-	-	2



ME804B.4	1	1	1	1	2	3	2	-	-	-	2	2	-	-	3
Avg	2	1.5	1.75	1.25	2	2.25	1.5	-	-	-	1.25	1.75	-	2	2.25

Course Name: FRACTURE MECHANICS

Course Code: ME 804 C

Contact Hours: 32L

Credit: 3

Course Outcomes:

Upon successful completion of this course, the student will be able to:

ME 804C.1 Explore several types of fractures and important parameters associated with it.

ME 804C .2 Understand the elasto-plastic behavior of a crack based on stress functions

ME 804C .3 Evaluate SERR using computational J Integral methods,

ME 804C .4 Use the knowledge of fatigue fracture and creep fracture to solve practical problems.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME804C.1	3	2	1	1	-	1	-	-	-	-	1	2	2	1	2
ME804C.2	3	2	2	2	-	1	-	1	-	-	2	2	2	-	3
ME804C.3	2	3	2	1	-	1	1	2	-	-	1	2	2	-	2
ME804C.4	2	2	2	2	-	2	1	1	-	-	1	2	2	-	-
Avg	2.5	2.2	1.7	1.5	-	1.25	1	1.3	-	-	1.2	2	2	1	2.6

SESSIONAL

Course Name: Project Part-II

Course Code: ME881

Contact Hours: 12P

Credit: 6

Course Outcomes:

Upon successful completion of this course, the student will be able to:

ME881.1 Explore several subject domains to choose a practical problem of interest

ME881.2 Understand the methods of literature survey to analyze research works

ME881.3 Analyze, design and evaluate necessary components for the project work

ME881.4 Assess the utility of the project work and present through written and oral communication

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME881.1	2	2	1	2	-	2	1	-	-	1	1	3	1	1	2
ME881.2	2	3	2	2	-	1	1	1	-	2	2	3	2	1	3
ME881.3	1	3	2	2	3	1	-	2	-	3	3	2	2	1	2
ME881.4		2	2	2	2	2	-	1	-	3	3	3	1	2	2
Avg.	1.6	2.5	1.7	2	2.5	1.5	1	1.3		2.25	2.25	2.7	1.5	1.25	2.25



Course Name: GRAND VIVA

Course Code: ME882

Contact Hours: 0L

Credit: 2

Course Outcomes:

Upon successful completion of this course, the student will be able to:

ME882.1 Carry an overall knowledge of major engineering subjects

ME882.2 Communicate effectively in an interview

ME882.3 Learn discipline, body language, positive attitude and ethics to follow whole life.

Course Articulation Matrix:

CO Codes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
ME882.1	1	1	1	-	-		-	-	-	1	-	1	1	1	2
ME882.2	-	-	-	-	-	1	-	-	-	2	-	2	1	1	3
ME882.3	-	-	-	-	-	1	-	-	-	3	1	2	1	1	3
Avg	1	1	1	-	-	1	-	-	-	2	1	1.66	1	1	2.66

.....