



COURSE OUTCOMES OF ALL COURSES (2019 SCHEME)

SEMESTER I

MAT 101 LINEAR ALGEBRA AND CALCULUS

- MAT101.1 Solve the consistent system of linear equations and to determine the nature of quadratic form.
- MAT101.2 Determine the maxima and minima of multivariable functions
- MAT101.3 Determine areas and volumes of geometrical shapes, mass and centre of gravity of plane laminae using multiple integrals
- MAT101.4 Determine whether a given series is convergent, absolutely convergent or conditionally convergent
- MAT101.5 Determine the Taylor and Fourier series expansion.

CYT 100 ENGINEERING CHEMISTRY

- CYT100.1 Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
- CYT100.2 Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
- CYT100.3 Understand the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterization of nano-materials.
- CYT100.4 Understand the knowledge of stereochemistry, conducting polymers and advanced polymers in engineering.
- CYT100.5 Apply the knowledge of different types of water treatment methods to develop skills for treating waste water

EST110 ENGINEERING GRAPHICS

- EST110.1 To able to draw the projection of points and lines located in different quadrants




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- EST110.2 To able prepare multi view orthographic projections of objects by visualizing them in different positions
- EST110.3 To able to draw sectional views and develop surfaces of a given object
- EST110.4 To prepare pictorial drawings using the principles of isometric.
- EST110.5 To convert 3D views to orthographic views and vice versa and perspective projections to visualize objects in three dimensions
- EST110.6 To obtain multi view projections and solid models of objects using CAD tools

EST130 BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING

- EST130.1 Apply fundamental concepts and circuit laws to solve simple DC electric circuits
- EST130.2 Develop and solve models of magnetic circuits
- EST130.3 Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
- EST130.4 Describe working of a voltage amplifier
- EST130.5 Outline the principle of an electronic instrumentation system
- EST130.6 Explain the principle of radio and cellular communication

HUN 101 LIFE SKILLS

- HUN101.1 Define and Identify different life skills required in personal and professional life.
- HUN101.2 Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress
- HUN101.3 Explain the basic mechanics of effective communication and demonstrate these through presentations.
- HUN101.4 Take part in group discussions.
- HUN101.5 Use appropriate thinking and problem solving techniques to solve new problems.
- HUN101.6 Understand the basics of teamwork and leadership

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- EST110.4 To prepare pictorial drawings using the principles of isometric.
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ESL130 ELECTRICAL & ELECTRONICS WORKSHOP

- ESL130.1 Demonstrate safety measures against electric shocks.
- ESL130.2 Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
- ESL130.3 Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
- ESL130.4 Identify and test various electronic components
- ESL130.5 Draw circuit schematics with EDA tools
- ESL130.6 Assemble and test electronic circuits on boards
- ESL130.7 Work in a team with good interpersonal skills

CYL120 ENGINEERING CHEMISTRY LAB

- CYL120.1 Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses.
- CYL120.2 Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs.
- CYL120.3 Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds.
- CYL120.4 Acquire the ability to understand, explain and use instrumental techniques for chemical analysis

SEMESTER II

MAT 102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS

- MAT102.1 Apply the concept of vector functions and learn to work with conservative vector field




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- MAT102.2 Apply computing integrals of scalar and vector field over surfaces in three-dimensional space.
- MAT102.3 Solve homogeneous and non-homogeneous linear differential equation with constant
- MAT102.4 Apply Laplace transforms to solve physical problems arising in engineering
- MAT102.5 Apply Fourier transforms to solve physical problems arising in engineering

PHT110 ENGINEERING PHYSICS

- PHT110.1 Compute the quantitative aspects of waves and oscillations in engineering systems
- PHT110.2 Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments
- PHT110.3 Examine the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices
- PHT110.4 Apply the knowledge of ultrasonics in non-destructive testing and use the principles of acoustics to explain the nature and characterization of acoustic design and to provide a safe and healthy environment
- PHT110.5 Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications

EST100 ENGINEERING MECHANICS

- EST100.1 Explain principles and theorems related to rigid body mechanics
- EST100.2 Describe the components of system of forces acting on the rigid body
- EST100.3 Apply the conditions of equilibrium to various practical problems involving different force system.
- EST100.4 Choose appropriate theorems, principles or formulae to solve problems of mechanics.
- EST100.5 Brief about dynamics and mechanical vibrations, solve simple numerical related to it.

EST102 PROGRAMMING IN C

- EST 102.1 Analyze a computational problem and develop an algorithm/flowchart to find its solution
- EST 102.2 Develop readable C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.




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- EST 102.3 Write readable C programs with arrays, structure or union for storing the data to be processed.
- EST 102.4 Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
- EST 102.5 Write readable C programs which use pointers for array processing and parameter passing
- EST 102.6 Develop readable C programs with files for reading input and storing output.

EST120 BASICS OF CIVIL & MECHANICAL ENGINEERING

- EST120.1 Recall the role of civil engineer in society to relate the various disciplines of Civil Engineering and types of buildings, area, and its functions, rules and regulations.
- EST120.2 Describe the importance, objectives and principles of surveying and to explain different types of building materials used for construction
- EST120.3 Describe about the building construction, and summarize about the basic infrastructure services and green buildings.
- EST120.4 Analyse thermodynamic cycles and to explain the features and working of IC engines.
- EST120.5 Explain the basic principles of refrigeration & air conditioning and the working of various hydraulic machines.
- EST120.6 Explain the basic manufacturing, metal joining and machining processes.


HUN 102 PROFESSIONAL COMMUNICATION

- HUN102.1 Develop vocabulary and language skills relevant to engineering as a profession
- HUN102.2 Analyze, interpret and effectively summarize a variety of textual content
- HUN102.3 Create effective technical presentations
- HUN102.4 Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
- HUN102.5 Identify drawbacks in listening patterns and apply listening techniques for specific needs

ESL 120 CIVIL AND MECHANICAL WORKSHOP

- ESL 120.1 Name and explain the use of various tools and devices for various civil engineering field measurements
- ESL 120.2 Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work




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- ESL 120.3 Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing..
- ESL 120.4 Identify Basic Mechanical workshop operations in accordance with the material and objects
- ESL 120.5 Apply appropriate Tools and Instruments with respect to the mechanical workshop trades.
- ESL 120.6 Apply appropriate safety measures with respect to the mechanical workshop trades

PHL120 ENGINEERING PHYSICS LAB

- ESL 120.1 Name and explain the use of various tools and devices for various civil engineering field measurements
- ESL 120.2 Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work
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- ESL 120.6 Apply appropriate safety measures with respect to the mechanical workshop trades

SEMESTER III

MAT 201 PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS

- MAT201.1 Solve the partial differential equation.
- MAT201.2 Analyze and solve one dimensional wave equation and heat equation.
- MAT201.3 Determine the continuity and differentiability of complex functions using Cauchy Riemann equations.
- MAT201.4 Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula
- MAT201.5 Apply residue theorem to compute several kinds of real integrals of complex function.



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MET201 MECHANICS OF SOLIDS

- MET201.1 Determine the stresses, strains and displacements of structures by tensorial and graphical approaches.
- MET201.2 Analyze the strength of materials using stress-strain relationships for structural and thermal loading.
- MET201.3 Determine the basic design parameters of shafts subjected to torsional loading and determine the bending moment and shear force diagrams of various beams.
- MET201.4 Determine the deflection of beams subjected to various loading conditions using Macaulay's method and strain energy methods.
- MET201.5 Determine the strength of columns and to explain the theories of failures and its relevance in mechanical design.

MET203 MECHANICS OF FLUIDS

- MET 203.1 To understand the properties of fluids and fluid statics.
- MET 203.2 To understand the various parameters in fluid kinematics
- MET 203.3 Calculate pressure variations in accelerating fluids using Euler and Bernoulli's principle
- MET 203.4 Evaluate head loss in pipes
- MET 203.5 To understand the concept of boundary layer and use dimensional analysis for model studies

MET 205 METALLURGY & MATERIAL SCIENCE

- MET205.1 Understand the basic chemical bonds, crystal structures (BCC, FCC, and HCP), and their relationship with the properties.
- MET205.2 Understand about the various surface defects in materials and grain boundary growth in crystalline materials.
- MET205.3 Describe the microstructure of metallic materials using phase diagrams and modify the microstructure and properties using different heat treatments.
- MET205.4 Understand about the basic principles of ferrous and non-ferrous metallurgy for selecting materials based on their specific applications.
- MET205.5 Describe and differentiate engineering materials on the basis of structure and properties and understand the mechanical failure in materials.

EST200 DESIGN AND ENGINEERING

- EST200.1 Explain the different concepts and principles involved in design engineering.
- EST200.2 Apply design thinking while learning and practicing engineering.




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EST200.3 Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering

MCN201 SUSTAINABLE ENGINEERING

- MCN201.1 Understand the relevance and the concept of sustainability and the global initiatives in this direction
- MCN201.2 Explain the different types of environmental pollution Problems & sustainable solutions
- MCN201.3 Discuss the environmental regulations and standards
- MCN201.4 Outline the concepts related to conventional and nonconventional energy
- MCN201.5 Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles

MEL201 COMPUTER AIDED MACHINE DRAWING

- MEL 201.1 Apply the knowledge of engineering drawings and standards to prepare standard dimensioned drawings of machine parts and other engineering components.
- MEL 201.2 Prepare standard assembly drawings of machine components and valves using part drawings and bill of materials
- MEL 201.3 Apply limits and tolerances to components and choose appropriate fits for given assemblies
- MEL 201.4 Interpret the symbols of welded, machining and surface roughness on the component drawings..
- MEL 201.5 Prepare part and assembly drawings and Bill of Materials of machine components and valves using CAD software

MEL203 MATERIAL TESTING LAB I

- MEL203.1 Conduct tension test on steel, aluminium, copper and brass
- MEL203.2 Conduct compression tests on spring, wood and concrete
- MEL203.3 Conduct flexural and torsion test to determine elastic constants
- MEL203.4 Determine hardness of metals




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SEMESTER IV

MAT202 PROBABILITY, STATISTICS AND NUMERICAL METHODS

- MAT 202.1 Understand the concept, properties and important models of discrete random variables to analyze suitable random phenomena
- MAT 202.2 Understand the concept, properties and important models of continuous random variables to analyze suitable random phenomena
- MAT 202.3 Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population
- MAT 202.4 Compute roots of equations, definite integrals and perform interpolation on given numerical data using standard numerical techniques
- MAT 202.5 Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.

MET 202 ENGINEERING THERMODYNAMICS

- MET 202.1 To understand the basic concepts of thermodynamic such as temperature, pressure, system, properties, process, state, cycles and equilibrium.
- MET 202.2 To apply the first Law of Thermodynamics on closed and control volume systems to solve preliminary problems.
- MET 202.3 To apply Second Law of Thermodynamics and entropy concepts in determining the thermal efficiency and change in entropy in various thermodynamic processes.
- MET 202.4 Understand the properties and behaviour of pure substance during various thermodynamic conditions
- MET 202.5 To understand the general thermodynamic relations by combining the first and second law of thermodynamics.

MET 206 FLUID MACHINERY

- MET 206.1 Explain the Constructional features of various turbines and to determine its performance characteristics
- MET 206.2 Determine the design characteristics of turbines and performance characteristics of centrifugal pump
- MET 206.3 Determine the performance characteristics of reciprocating pump and describe various pumping devices.
- MET 206.4 Determine the performance characteristics of various air compressors



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MET 206.5 Determine the performance characteristics of gas turbines and identify the improvements in basic gas turbine cycle

MCN 202 CONSTITUTION OF INDIA

- MCN202.1 Explain the background of the present constitution of India and features.
- MCN202.2 Understand the fundamental rights and duties.
- MCN202.3 Understand the working of the union executive, parliament and judiciary.
- MCN202.4 Understand the working of the state executive, legislature and judiciary.
- MCN202.5 Understand the special provisions and constitutional and statutory institutions.

MET 204 MANUFACTURING PROCESS

- MET 204.1 To understand the basic principles of foundry practices and special casting processes.
- MET 204.2 To categorize welding processes according to welding principle and material
- MET 204.3 To understand mechanics of rolling and its application
- MET 204.4 To differentiate different forging mechanism and its application
- MET 204.5 To illustrate and describe the principles and various methods for locating and clamping.

HUT200 PROFESSIONAL ETHICS

- HUT200.1 Understand the core values that shape the ethical behaviour of a professional
- HUT200.2 Explain the ethical thought process in a professional environment
- HUT200.3 Explain the role and responsibility in technological development by keeping personal ethics and legal Ethics.
- HUT200.4 Understand the moral and ethical problems through examples and case studies
- HUT200.5 Understand the importance of human values and social values to global ethical issues.

MEL 202 FM & HM LAB

- MEL 202.1 Determine the coefficient of discharge and calibrate flow measuring devices
- MEL 202.2 Verify Bernoulli's Theorem and Evaluate the losses in pipes
- MEL 202.3 Determine the metacentric height and stability of floating bodies
- MEL 202.4 Determine the efficiency and plot the characteristic curves of different types of turbines



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- MEL 202.5 Determine the efficiency and plot the characteristic curves of different types of pumps

MEL 204 MACHINE TOOLS LAB- I

- MEL 204.1 To understand the parts of various machine tools and impart hands on experience on lathe, drilling, shaping, milling, slotting and grinding machine.
- MEL 204.2 To develop knowledge and importance of metal cutting parameters such as feed, velocity and depth of cut etc on cutting force and surface roughness obtainable.
- MEL 204.3 To develop fundamental knowledge on tool materials, cutting fluids and tool wear mechanisms.
- MEL 204.4 To study process parameters and practice on arc welding technologies.
- MEL 204.5 Prepare the specimen for microscopic study and to perform the heat treatment process on the micro-structure

SEMESTER V


MET 301 MECHANICS OF MACHINERY

- MET 301.1 To understand different types of mechanisms, their inversions and to determine their velocity using relative velocity & instantaneous center method.
- MET 301.2 Perform analysis and synthesis of various mechanisms.
- MET 301.3 To understand various gear terminologies and to solve various problems associated with gears and to understand different method used in the kinematic synthesis of mechanism.
- MET 301.4 Calculate the static force in mechanisms and gyroscopic effect in various situations
- MET 301.5 Determine the unbalancing forces in rotating and reciprocating masses.

MET 303 THERMAL ENGINEERING

- MET303.1 Determine the performance characteristics of steam power cycle and related components
- MET303.2 Determine the performance characteristics of steam turbines
- MET303.3 Determine the performance characteristics of IC engines
- MET303.4 Explain the combustion phenomenon and pollution in IC engines
- MET303.5 Determine the performance characteristics of refrigerator, air-conditioner and various psychrometric properties.




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MET305 INDUSTRIAL & SYSTEMS ENGINEERING

- MET305.1 Understand the various tools and techniques in industrial engineering.
- MET305.2 Understand the inventory system used in industry.
- MET305.3 Understand the importance of industrial relations.
- MET305.4 Describe the selection of lean manufacturing tools to eliminate waste and the framework of agile manufacturing.
- MET305.5 Understand the core and extended modules of ERP.

MET 307 MACHINE TOOL AND METROLOGY

- MET307.1 Explain the various machining processes and relevant quantities such as velocities, forces and powers of cutting tools.
- MET307.2 Describe the machining and cutting force determination of milling and grinding operations.
- MET307.3 Understand the limitations of various machining process with regard to shape formation and surface texture.
- MET307.4 Describe the mechanical measurement systems and principle of instruments for dimension measurement.
- MET307.5 Understand the working principles of various advanced measuring devices and machine tool metrology.

HUT300 INDUSTRIAL ECONOMICS & FOREIGN TRADE

- HUT300.1 Explain the problem of scarcity of resources and consumer behavior, and to evaluate the impact of government policies on the general economic welfare.
- HUT300.2 Take appropriate decisions regarding volume of output and to evaluate the social cost of production.
- HUT300.3 Determine the functional requirement of a firm under various competitive conditions.
- HUT300.4 Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.
- HUT300.5 Determine the impact of changes in global economic policies on the business opportunities of a firm.

MCN301 DISASTER MANAGEMENT

- MCN301.1 Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle.
- MCN301.2 Distinguish between different hazard types and vulnerability types and do vulnerability assessment.




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- MCN301.3 Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk and response for it.
- MCN301.4 Discuss about the stakeholder's role, communication and capacity related issues.
- MCN301.5 Explain the various legislations and best practices for disaster management and risk reduction

MEL331 MACHINE TOOLS LAB II

- MEL331.1 Apply the procedures to measure length, angles, width, depth, bore diameters, internal and external tapers, tool angles, and surface roughness by using different instruments and by different indirect methods.
- MEL331.2 Determine limits and fits and allocate tolerances for machine components
- MEL331.3 CNC programming and to use coordinate measuring machine to record measurements of complex profiles with high sensitivity.
- MEL331.4 Use effective methods of measuring straightness, Squareness, flatness, roundness, profile, screw threads and gear teeth.
- MEL331.5 Securing knowledge of manufacturing components within the tolerance limit and surface roughness according to given drawings using various machine tools.

MEL 333 THERMAL ENGINEERING LAB-I

- MEL 333.1 Measure thermo-physical properties of solid, liquid and gaseous fuels
- MEL 333.2 Identify various systems and subsystems of Diesel and petrol engines
- MEL 333.3 Analyse the performance characteristics of internal combustion engines
- MEL 333.4 Prepare the heat balance chart and evaluate the cooling curve of an IC Engine.
- MEL 333.5 Interpret the performance characteristics of air compressors / blowers

SEMESTER VI

MET302HEAT & MASS TRANSFER

- MET302.1 Apply principles of heat transfer to engineering problems and obtain solutions to problems involving conduction heat transfer.
- MET302.2 Apply principles of heat transfer associated with convection and obtain solutions to problems involving convection heat transfer.




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- MET302.3 To determine parameters that affect the performance of heat exchangers and systems with boiling and condensation.
- MET302.4 To understand the physical mechanism involved in radiation heat transfer and examine the radioactive heat exchange between surfaces
- MET302.5 Apply principles of diffusion mass transfer and obtain solutions to problems involving diffusion mass heat transfer.

MET 304 DYNAMICS AND DESIGN OF MACHINERY

- MET304.1 To determine engine force analysis and to draw turning moment diagrams
- MET304.2 To determine free and forced vibrations of single degree of freedom systems
- MET304.3 To determine the natural frequencies of a two degree of freedom vibrating system and to calculate the stresses in a structural member due to combined loading
- MET304.4 To design machine elements subjected to fatigue loading and riveted joints
- MET304.5 To design welded joint and close coiled helical compression spring

MET306 ADVANCED MANUFACTURING ENGINEERING

- MET306.1 To understand the concepts of powder metallurgy and solve problems on theory of metal cutting.
- MET306.2 To understand CNC programming and select appropriate tooling and fixtures.
- MET306.3 To categorize the various nontraditional material removal process based on energy sources and mechanism employed.
- MET306.4 To analyze the processes and evaluate the role of each process parameter during micro machining of various advanced material removal processes.
- MET306.5 To explain the processes used in additive manufacturing for a range of materials and applications.

MET308 COMPREHENSIVE COURSE WORK

- MET308.1 To identify the fundamental aspects of mechanical engineering problem/situation and give answers in dealing with them.
- MET308.2 To assess the comprehensive knowledge gained in core courses relevant to the mechanical branch of study

MET312 NON DESTRUCTIVE TESTING

- MET312.1 The students will be able to explain surface NDT and visual testing




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- MET312.2 The students will be able to gain knowledge about the Liquid penetrant testing and their applications
- MET312.3 The students will be able to understand the basic principle of Magnetic particle testing and their applications
- MET312.4 The students will be able to explain ultrasonic testing and its applications
- MET312.5 The students will be able to describe Radiography testing and Eddy current testing

HUT310 MANAGEMENT FOR ENGINEERS

- HUT310.1 Explain the characteristics of management in the contemporary context
- HUT310.2 Describe the functions of management.
- HUT310.3 Demonstrate ability in decision making process and productivity analysis
- HUT310.4 Illustrate project management technique and develop a project schedule
- HUT310.5 Summarize the functional areas of management, Comprehend the concept of entrepreneurship, and create business plans.

MEL332 COMPUTER AIDED DESIGN & ANALYSIS LAB

- MEL332.1 Students are able to create higher end 3D solid models of various parts
- MEL332.2 Students are capable of developing 3D models of machine components, complex geometries etc.
- MEL332.3 Students are capable to assembly the parts created to develop the whole mechanism
- MEL332.4 Students can apply their knowledge in importing CAD geometries and to modify and mesh using different meshing methods and local meshing controls as a part of preprocessing of the FE problem in ANSYS APDL.
- MEL332.5 Students have knowledge to conduct simple structural, fluid flow and thermal analysis problems in ANSYS FLUENT.

MEL334 THERMAL ENGINEERING LAB II

- MEL334.1 Evaluate thermal properties of materials in conduction, convection and radiation
- MEL334.2 Analyse the performance of heat exchangers
- MEL334.3 Illustrate the operational performances of refrigeration and air conditioning systems.
- MEL334.4 Perform calibration of thermocouples and pressure gauges.




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SEMESTER VII

MET 401 DESIGN OF MACHINE ELEMENTS

- MET401.1 To determine engine force analysis and to draw turning moment diagrams
- MET401.2 To determine free and forced vibrations of single degree of freedom systems
- MET401.3 To determine the natural frequencies of a two degree of freedom vibrating system and to calculate the stresses in a structural member due to combined loading
- MET401.4 To design machine elements subjected to fatigue loading and riveted joints
- MET401.5 To design welded joint and close coiled helical compression spring

MET413 ADVANCED METHODS IN NON DESTRUCTIVE TESTING

- MET413.1 Understand the theoretical and practical knowledge in methods of non-destructive testing processes
- MET413.2 Understand the knowledge of advanced methods in ultrasonic testing which enables them to perform inspection of samples.
- MET413.3 Illustrate complete theoretical and practical understanding of the radiographic testing, interpretation and evaluation.
- MET413.4 Understand the recent advances in the field of non-destructive testing
- MET413.5 Outline the recent and advanced developments in radiography testing

MCN401 INDUSTRIAL SAFETY ENGINEERING

- MCN401.1 Describe the theories of accident causation and preventive measures of industrial accidents.
- MCN401.2 Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping.
- MCN401.3 Explain different issues in construction industries.
- MCN401.4 Describe various hazards associated with different machines and mechanical material handling.
- MCN401.5 Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards.

CET445 NATURAL DISASTERS & MITIGATION

- CET445.1 Explain interaction between subsystems of earth that give rise to hazards and their potential for disasters
- CET445.2 Explain the evolving concepts and thoughts of management of hazards and disasters




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- CET445.3 Analyze the causes behind natural disasters and evaluate their magnitude and impacts
- CET445.4 Create management plans for hazards and disasters, and understand the roles of agencies involved.
- CET445.5 Explain the concept of sustainable development and EIA and their role in mitigating disasters

MEL411 MECHANICAL ENGINEERING LAB

- MEL411.1 Apply the concept on design and analysis of mechanisms in the machines.
- MEL411.2 Apply the concept on vibration analysis
- MEL411.3 Conduct milling operations and measure the cutting forces associated with milling machining operations.
- MEL411.4 Understand the working of 3D Printer and prepare a model.
- MEL411.5 Use appropriate systems for data acquisition and control of product and processes

MED415 PROJECT PHASE I

- MED 415.1 Model and solve real world problems by applying knowledge across domains
- MED 415.2 Develop products, processes or technologies for sustainable and socially relevant applications
- MED 415.3 Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
- MED 415.4 Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms
- MED 415.5 Identify technology/research gaps and propose innovative/creative solutions
- MED 415.6 Organize and communicate technical and scientific findings effectively in written and oral forms

MEQ413 SEMINAR

- MEQ413.1 Identify academic documents from the literature which are related to her/his areas of interest
- MEQ413.2 Read and apprehend an academic document from the literature which is related to her/ his areas of interest
- MEQ413.3 Prepare a presentation about an academic document
- MEQ413.4 Give a presentation about an academic document
- MEQ413.5 Prepare a technical report




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SEMESTER VIII

MET 458 ADVANCED ENERGY ENGINEERING

- ME403.1 To understand the global and Indian energy scenario and working principles of various power plants
- ME403.2 To understand the various solar and wind energy harness methods and its applications
- ME403.3 To understand Biomass energy conversion technologies and its utilization.
- ME403.4 To understand principles of non-conventional energy resources.
- ME403.5 To understand the environmental impacts of energy conversion and sustainable energy.

MET414 QUALITY MANAGEMENT

- MET414.1 To be conversant with important terms for quality management in organisations and have a complete theoretical and practical understanding of the contributions of Quality Gurus
- MET414.2 Demonstrate knowledge of the underlying principles of strategic quality management
- MET414.3 Identify various human dimensions of TQM
- MET414.4 Implement different tools and techniques in TQM
- MET414.5 Identify core and extended modules of ISO 9000 family of standards

MET416 COMPOSITE MATERIAL

- MET 416.1 To understand composites, various matrices and reinforcements used in composites.
- MET 416.2 To Explain the fabrication, structure, properties and applications of various fibre reinforced composites
- MET 416.3 Explain the properties, characteristics, applications and processing of polymer matrix composites (PMC)
- MET 416.4 Explain the properties, characteristics, applications and production techniques of Metal matrix composites (MMC)
- MET 416.5 Explain the properties, characteristics, applications and production techniques of Ceramic matrix composites (CMC)

MET402MECHATRONICS

- MET402.1 Students will understand the basic structure of Mechatronics system, knowledge on the various types of Sensors, hydraulic and pneumatic actuators.



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- MET402.2 Students will develop and idea about Micro Electro Mechanical System, Deep Reactive Ion Etching (DRIE) and LIGA Process.
- MET402.3 Students will be able to select various mechatronics elements in the Design of modern CNC machines
- MET402.4 Students will be able to understand the basic of PLC and assess case studies of mechatronic systems.
- MET402.5 Students will gain fundamental knowledge about vision systems and Mechatronics in Robotics.

MET404 COMPREHENSIVE COURSE VIVA

- MET404.1 To identify the fundamental aspects of mechanical engineering problem/situation and give answers in dealing with them.
- MET404.2 To assess the comprehensive knowledge gained in core courses relevant to the mechanical branch of study

MED416 PROJECT PHASE II

- MED 415.1 Model and solve real world problems by applying knowledge across domains
- MED 415.2 Develop products, processes or technologies for sustainable and socially relevant applications
- MED 415.3 Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
- MED 415.4 Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms
- MED 415.5 Identify technology/research gaps and propose innovative/creative solutions
- MED 415.6 Organize and communicate technical and scientific findings effectively in written and oral forms



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COURSE OUTCOMES

2019 K.U. SYLLABUS

SEMESTER I

Course Name/Code: linear Algebra And Calculus (MAT 101)

Cours Year: 2019-20

CO	Description
MAT 101.1	solve systems of linear equations, diagonalize matrices and characterize quadratic forms
MAT 101.2	compute the partial and total derivatives and maxima and minima of multivariable functions
MAT 101.3	compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and center of gravity of plane laminae
MAT 101.4	perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
MAT 101.5	determine the Taylor and Fourier series expansion of functions and learn their applications.

Course Name/Code: Engineering Physics A (PHT 100)

Cours Year: 2019-20

CO	Description
PHT 100.1	Compute the quantitative aspects of waves and oscillations in engineering systems.
PHT 100.2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
PHT 100.3	Analyze the behavior of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.


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PHT 100.4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems
PHT 100.5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fiber optic communication system

Course Name/Code: Engineering Mechanics /EST 100 CoursYear:2019-20

CO	Description
EST 100.1	Recall principles and theorems related to rigid body mechanics
EST100.2	Identify and describe the components of system of forces acting on the rigid body
EST100.2	Apply the conditions of equilibrium to various practical problems involving different force system.
EST100.3	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
EST100.4	Solve problems involving rigid bodies, applying the properties of distributed areas and masses

Course Name/Code: Basics of Civil and Mechanical Engineering/EST 120 CoursYear:2019-20

CO	Description
EST120.1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
EST120.2	Explain different types of buildings, building components, building materials and building construction
EST120.3	Describe the importance, objectives and principles of surveying.
EST120.4	Summaries the basic infrastructure services MEP, HVAC, elevators, escalators and ramps


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EST120.5	Discuss the Materials, energy systems, water management and environment for green buildings.
EST120.6	Analyze thermodynamic cycles and calculate its efficiency
EST120.7	Illustrate the working and features of IC Engines
EST120.8	Explain the basic principles of Refrigeration and Air Conditioning
FST120.9	Describe the working of hydraulic machines
EST120.10	Explain the working of power transmission elements
EST120.11	Describe the basic manufacturing, metal joining and machining processes

Course Name/Code:Life Skills / HUN100CoursYear:2019-20

CO	Description
HUN100.1	Define and Identify different life skills required in personal and professional life
HUN100.2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
HUN100.3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
HUN100.4	Take part in group discussions
HUN100.5	Use appropriate thinking and problem solving techniques to solve new problems
HUN100.6	Understand the basics of teamwork and leadership


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Course Name/Code:Engineering Physics Lab/ PHL 120CoursYear:2019-20

CO	Description
PHL 120.1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
PHL 120.2	Understand the need for precise measurement practices for data recording
PHL 120.3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
PHL 120.4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics
PHL 120.5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

Course Name/Code:Civil and Mechanical Workshop/ ESL 120CoursYear:2019-20

CO	Description
ESL 120 .1	Name different devices and tools used for civil engineering measurements
ESL 120 .2	Explain the use of various tools and devices for various field measurements
ESL 120 .3	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work.
ESL 120.4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
ESL 120.5	Compare different techniques and devices used in civil engineering measurements
ESL 120.6	Identify Basic Mechanical workshop operations in accordance with the material and objects

ESL 120.7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
ESL 120.8	Apply appropriate safety measures with respect to the mechanical workshop trades

SEMESTER 2

Course Name/Code: Differential Equations and Transforms/MAT 102 Course Year: 2019-20

CO	Description
MAT102.1	Compute the derivatives and line integrals of vector functions and learn their applications
MAT102.2	Evaluate surface and volume integrals and learn their inter-relations and applications
MAT102.3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
MAT102.4	Compute Laplace transform and apply them to solve ODEs arising in engineering
MAT102.5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering

Course Name/Code: Engineering Chemistry (CYT100)

Course Year: 2019-20

CO	Description
CYT100.1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
CYT100.2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
CYT100.3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterization of nanomaterials.



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CYT100.4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
CYT100.5	Study various types of water treatment methods to develop skills for treating wastewater

Course Name/Code: Engineering Graphics (EST110) Course Year:2019-20

CO	Description
EST110.1	Draw the projection of points and lines located in different quadrants
EST110.2	Prepare Multiview orthographic projections of objects by visualizing them in different positions
EST110.3	Draw sectional views and develop surfaces of a given object
EST110.4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
EST110.5	Convert 3D views to orthographic views
EST110.6	Obtain Multiview projections and solid models of objects using CAD tools

Course Name/Code: Basics Of Electrical and Electronics Engineering/EST 130 Year:2019-20

CO	Description
EST 130.1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
EST 130.2	Develop and solve models of magnetic circuits



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EST 130.3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
EST 130.4	Describe working of a voltage amplifier
EST 130.5	Outline the principle of an electronic instrumentation system
EST 130.6	Explain the principle of radio and cellular communication

Course Name/Code: Professional Communication/ HUN102

Course Year: 2019-20

CO	Description
HUN102.1	Understand the relevance and the concept of sustainability and the global initiatives in this direction.
HUN102.2	Explain the different types of environmental pollution problems and their sustainable solutions.
HUN102.3	Discuss the environmental regulations and standards.
HUN102.4	Outline the concepts related to conventional and non-conventional energy.
HUN102.5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles.

Course Name/Code: Programming in C /EST 102 Course Year: 2019-20

CO	Description
EST 102.1	Analyze a computational problem and develop an algorithm/flowchart to find its solution


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EST 102.2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
EST 102.3	Write readable C programs with arrays, structure or union for storing the data to be processed
EST 102.4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
EST 102.5	Write readable C programs which use pointers for array processing and parameter passing
EST 102.6	Develop readable C programs with files for reading input and storing output

Course Name/Code: Electrical and Electronics Workshops /ESL 130 Course Year:2020-21

CO	Description
ESL 130.1	Demonstrate safety measures against electric shocks.
ESL 130.2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
ESL 130.3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
ESL 130.4	Identify and test various electronic components
ESL 130.5	Draw circuit schematics with EDA tools
ESL 130.6	Assemble and test electronic circuits on boards
ESL 130.7	Work in a team with good interpersonal skills

Course Name/Code:Engineering Chemistry Lab/CYL 120 Course Year:2019-20


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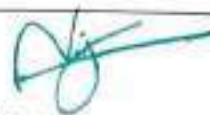
CO	Description
CYL 120.1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
CYL 120.2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
CYL 120.3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analyzing and interpreting the IR spectra and NMR spectra of some organic compounds
CYL 120.4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
CYL 120.5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
CYL 120.6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum

SEMESTER 3

Course Name/Code: Discrete Mathematical Structures / CST 201

Course Year:2020-21

CO	Description
CST 201.1	Check the validity of predicates in Propositional and Quantified Propositional Logic using truth tables, deductive reasoning and inference theory on Propositional Logic
CST 201.2	Solve counting problems by applying the elementary counting techniques - Rule of Sum, Rule of Product, Permutation, Combination, Binomial Theorem, Pigeonhole Principle and Principle of Inclusion and Exclusion



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CST 201.3	Classify binary relations into various types and illustrate an application for each type of binary relation, in Computer Science
CST 201.4	Illustrate an application for Partially Ordered Sets and Complete Lattices, in Computer Science
CST 201.5	Explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients
CST 201.6	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups

Course Name/Code: Data Structures/CST 201 Course Year:2020-21

CO	Description
CST 201.1	Compare different programming methodologies and define asymptotic notations to analyze performance of algorithms
CST 201.2	Use appropriate data structures like arrays, linked list, stacks and queues to solve real world problems efficiently.
CST 201.3	Write an algorithm to find the solution of a computational problem by selecting an appropriate data structure(Linked List)to represent a data item to be processed
CST 201.4	Write an algorithm to find the solution of a computational problem by selecting an appropriate data structure (binary tree/graph) to represent a data item to be processed
CST201.5	Select appropriate sorting algorithms to be used in specific circumstances .

Course Name/Code: Logic System Design/CST 203 Course Year:2020-21

CO	Description
CST 203.1	Illustrate decimal, binary, octal, hexadecimal and BCD number systems, perform conversions among them and do the operations - complementation, addition, subtraction, multiplication and division on binary numbers
CST 203.2	Simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates
CST 203.3	Design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker
CST 203.4	Design sequential circuits - Registers, Counters and Shift Registers.
CST 203.5	Use algorithms to perform addition and subtraction of binary, BCD and floating point numbers

Course Name/Code: Object Oriented Programming using Java/ CST 205 Course Year:2020-21

CO	Description
CST 205.1	Write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism (Cognitive KnowledgeLevel: Apply)
CST 205.2	Utilize datatypes, operators, control statements, built in packages & interfaces, Input/ Output Streams and Files in Java to develop programs (Cognitive Knowledge Level: Apply)
CST 205.3	Illustrate how robust programs can be written in Java using exception handling mechanism (Cognitive Knowledge Level: Understand)



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CST 205.4	Write application programs in Java using multithreading and database connectivity(Cognitive Knowledge Level:Apply)
CST 205.5	Write Graphical User Interface based application programs by utilising event handling features and Swing in Java. (Cognitive Knowledge Level:Apply)

Course Name/Code: Professional Ethics/HUT 200 Course Year:2020-21

co	description
HUT 200 .1	Understand the core values that shape the ethical behavior of a professional.
HUT 200.2	Adopt a good character and follow an ethical life
HUT 200 .3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
HUT 200 .4	Solve moral and ethical problems through exploration and assessment by established experiments
HUT 200 .5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.

Course Name/Code :SUSTAINABLE ENGINEERING/ MNC 201 Course Year:2020-21

co	Description
MNC 201 .1	Understand the relevance and the concept of sustainability and the global Initiatives in this direction
MNC 201 .2	Explain the different types of environmental pollution problems and their sustainable solutions



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MNC 201.3	Discuss the environmental regulations and standards
MNC 201.4	Outline the concepts related to conventional and non-conventional energy
MNC 201.5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles

Course Name/Code :Data Structures Lab/ CSL 201

Course Year:2020-21

co	Description
CSL 201.1	Write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements
CSL 201.2	Write a time/space efficient program to sort a list of records based on a given key in the record
CSL 201.3	Examine a given Data Structure to determine its space complexity and time complexities of operations on it
CSL 201.4	Design and implement an efficient data structure to represent given data
CSL 201.5	Write a time/space efficient program to convert an arithmetic expression from one notation to another

Course Name/Code :Object Oriented Programming Lab/ CSL 203 Course Year:2020-21

co	descriptive
CSL 203.1	Implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java
CSL 203.2	Implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files
CSL 203.3	Implement robust application programs in Java using exception handling


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CSL 203 .4	Implement application programs in Java using multithreading and database
CSL 203 .5	Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java

SEMESTER 4

Course Name/Code :Graph Theory/ MAT 206 Course Year:2020-21

co	description
MAT 206 .1	Understand the basic concepts of Graph Theory
MAT 206 .2	Formulate and prove fundamental theorems on Eulerian and Hamiltonian graphs
MAT 206 .3	Apply various theorems and algorithms on Trees
MAT 206.4	Understand planar graphs ,their properties and applications for planar graph
MAT 206.5	Demonstrate the knowledge of fundamental concepts of matrix representation of graphs and colouring problems

Course Name/Code :Computer Organization And Architecture/ CST 202 Course Year:2020-21

CO	Description
CST 202.1	Identify the relevance of basic components, Memory organization and Bus organisation in a digital computer.
CST 202.2	Illustrate the design of Arithmetic Logic Unit and explain the usage of registers in it.
CST 202.3	Explain the implementation aspects of arithmetic algorithms in a digital computer.



CST 202.4	Develop the control logic for a given arithmetic problem
CST 202.5	Explain the types of memory systems and mapping functions used in memory systems.

Course Name/Code : Database Management System CST 204 Course Year: 2020-21

CO	Description
CST 204.1	Summarize and exemplify fundamental nature and characteristics of database systems
CST 204.2	Model real world scenarios given as informal descriptions, using Entity Relationship diagrams.
CST 204.3	Model and design solutions for efficiently representing and querying data using relational model
CST 204.4	Demonstrate the features of indexing and hashing in database applications
CST 204.5	Discuss and compare the aspects of Concurrency Control and Recovery in Database systems
CST 204.6	Explain various types of NoSQL databases

Course Name/Code : Operating System/CST 206 Course Year: 2020-21

CO	Description
CST 206.1	Explain the relevance, structure and functions of Operating Systems in computing devices.
CST 206.2	Illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems.
CST 206.3	Explain process synchronization techniques like mutex locks, semaphores and monitors and mechanisms to prevent, avoid, detect and recover deadlocks

CST 206.4	Illustrate different memory management techniques in operating systems.
CST 206.5	Explain the security aspects and algorithms for file and storage management in Operating Systems

Course Name/Code :Design Engineering/ EST 200 Course Year:2020-21

CO	Description
EST 200.1	Explain the different concepts and principles involved in design engineering.
EST 200.2	Apply design thinking while learning and practicing engineering
EST 200.3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.

Course Name/Code :Constitution Of India/MCN 202 Course Year:2020-21

CO	Description
MNC 202.1	Explain the background of the present constitution of India and features.
MNC 202.2	Utilize the fundamental rights and duties.
MNC 202.3	Understand the working of the union executive, parliament and judiciary.
MNC 202.4	Understand the working of the state executive, legislature and judiciary.
MNC 202.5	Utilize the special provisions, statutory institutions and the federal system.

Course Name/Code :Digital Lab/CSL 202 Course Year:2020-21

CO	Description
CSL 202.1	Design and implement combinational logic circuits using Logic Gates (Cognitive Knowledge Level:
CSL 202.2	Design and implement sequential logic circuits using Integrated Circuits
CSL 202.3	Simulate functioning of digital circuits using programs written in a Hardware Description Language
CSL 202.4	Function effectively as an individual and in a team to accomplish a given task of designing and implementing digital circuits

Course Name/Code : Operating Systems Lab/CSL 204

Course Year:2020-21

CSL 204.1	Illustrate the use of systems calls in Operating Systems. Implement Process Creation and Inter Process Communication in Operating Systems
CSL 204.2	Implement First Come First Served, Shortest Job First, Round Robin and Priority-based CPU Scheduling Algorithms.
CSL 204.3	Illustrate the performance of First In First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms
CSL 204.4	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems.
CSL 204.5	Implement modules for Storage Management and Disk Scheduling in Operating Systems.

SEMESTER 5

Course Name/Code : Formal Language And Automata Theory/CST301 Course Year:2021-22

CO	Description
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CST301.1	Classify a given formal language into Regular, Context-Free, Context Sensitive, Recursive or Recursively Enumerable.
CST301.2	Explain a formal representation of a given regular language as a finite state automaton, regular grammar, regular expression and Myhill-Nerode relation.
CST301.3	Design a Pushdown Automaton and a Context-Free Grammar for a given context-free language
CST301.4	Design Turing machines as language acceptors or transducers.
CST301.5	Explain the notion of decidability

Course Name/Code :Computer Networks/CST-303 Course Year:2020-21

CST 303 .1	Explain the features of computer networks, protocols, and network design models
CST 303.2	Explain the design issues of data link layer, link layer protocols, bridges and switches.
CST 303 .3	Select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network.
CST 303 .4	Illustrate the functions and protocols of the network layer.
CST 303 .5	Illustrate the functions and protocols of the transport layer, and application layer in inter- networking.

Course Name/Code :System Software /CST 305

Course Year:2021-22

CO	Description
CST 305.1	Distinguish software's into system and application software categories.
CST 305.2	Identify standard and extended architectural features of machines.

CST 305.3	Identify machine dependent features of system software
CST 305.4	Design algorithms for system software's and analyze the effect of data structures
CST 305.5	Understand the features of device drivers and editing & debugging tools.

Course Name/Code :Microprocessor And Microcontroller /CST 307 Course Year:2021-22

CO	Description
CST 307.1	Describe how pipelining is implemented in 8086 microprocessor and illustrate maximum and minimum mode signals in 8086. Illustrate the architecture, modes of operation and addressing modes of microprocessors.
CST 307.2	Illustrate the architecture, modes of operation and addressing modes of Microprocessors, develop 8086 assembly language program
CST 307.3	Demonstrate interrupts, its handling and programming in 8086, Differentiate the function of various types of interrupts and perform interrupt programming.
CST 307.4	Interface and perform programming on peripheral ICs like 8255, 8279, 8257.
CST 307.5	Illustrate the architecture, modes of operation ,instruction and addressing modes of 8051 microcontroller.

Course Name/Code :Management Of Software Systems/CST 309 Course Year:2021-22

CO	Description
CST 309.1	Demonstrate Traditional and Agile Software Development approaches
CST 309.2	Prepare Software Requirement Specification and Software Design for a given problem.
CST 309.3	Justify the significance of design patterns and licensing terms in software development, prepare testing, maintenance and DevOps strategies for a project.

CST 309.4	Make use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project, with a traditional/agile framework.
CST 309.5	Utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices.

Course Name/Code :Disaster Management/MCN 301 Course Year:2021-22

CO	Description
MCN 301.1	Define and use various terminologies in use in disaster management parlance and organize each of these terms in relation to the disaster management cycle .
MCN 301.2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment
MCN 301.3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk and response for it.
MCN 301.4	Discuss about the stakeholder's role, communication and capacity related issues.
MCN 301.5	Explain the various legislations and best practices for disaster management and risk reduction.

Course Name/Code :System Software And Microprocessor Lab /CSL 303 Course Year:2021-22

CO	System Software And Microprocessor Lab
CSL 303.1	Develop 8086 programs and execute it using a microprocessor kit.
CSL 303.2	Develop 8086 programs and, debug and execute it using MASM assemblers

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CSL 303.3	Develop and execute programs to interface stepper motor, 8255, 8279 and digital to analog converters with 8086 trainer kit
CSL 303.4	Implement and execute different scheduling and paging algorithms in OS
CSL 303.5	Design and implement assemblers, Loaders and macro-processors.

Course Name/Code : Database Management System Lab / CSL 333 Course Year: 2021-22

CO	Description
CSL 333.1	Design database schema for a given real world problem-domain using standard design and modeling approaches.
CSL 333.2	Construct queries using SQL for database creation, interaction, modification, and updation.
CSL 333.3	Design and implement triggers and cursors.
CSL 333.4	Implement procedures, functions, and control structures using PL/SQL.
CSL 333.5	Perform CRUD operations in NoSQL Databases. and develop database applications using front-end tools and back-end DBMS.

SEMESTER 6

Course Name/Code : Compiler Design/ CST302 Course Year: 2021-22

CO	Description
CST302.1	Explain the phases in compilation process


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CST302.2	Model language syntax using Context Free Grammar and develop parse tree representation using leftmost and rightmost derivations
CST302.3	Compare different types of parsers(Bottom-up and Top-down) and construct parser for a given grammar
CST302.4	Build Syntax Directed Translation for a context free grammar, compare various storage allocation strategies and classify intermediate representations
CST302.5	Illustrate code optimization and code generation techniques in compilation

Course Name/Code :Computer Graphics & Image/ CST304 Course Year:2021-22

CO	Description
CST304.1	Describe the working principles of graphics devices and Illustrate line drawing, circle drawing and polygon filling algorithms.
CST304.2	Demonstrate geometric representations, transformations on 2D & 3D objects.
CST304.3	Summarize clipping algorithms, projection algorithms, visible surface detection methods
CST304.4	Summarize the concepts of digital image representation, processing and demonstrate pixel relationships
CST304.5	Solve image enhancement and segmentation problems using spatial domain techniques

Course Name/Code :Algorithm Analysis & Design/ CST305

Course Year:2021-22

CO	Description
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CST306.1	Analyze any given algorithm and express its time and space complexities in asymptotic notations. Derive recurrence equations and solve it using Iteration, Recurrence Tree, Substitution and Master's Method to compute time complexity of algorithms.
CST306.2	Illustrate Graph traversal algorithms & applications and Advanced Data structures like AVL trees and Disjoint set operations.
CST306.3	Demonstrate Divide-and-conquer and Greedy Strategy design techniques.
CST306.4	Design techniques for Dynamic programming, Branch-and Bound and Backtracking algorithm
CST306.5	Classify a problem as computationally tractable or intractable and identify the suitable design strategy to solve a given problem.

Course Name/Code :Foundation Of Security In Computing/ CST332 Course Year2021-22

CO	Description
CST332.1	Illustrate the operations and properties of algebraic structures, integer arithmetic and modular arithmetic.
CST332.2	Use the concepts of prime numbers and factorization for ensuring security in computing systems
CST332.3	Illustrate the concepts of Linear Congruence, Primitive Roots, Discrete Logarithms and Elliptic Curve Arithmetic
CST332.4	Summarize the threats and attacks related to computer and program security
CST332.5	Outline the key aspects of operating system and database security

Course Name/Code :Comprehensive Course Work/ CST 308 Course Year:2021-22

CO	


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CST 308.1	Comprehend the concepts and applications of data structures
CST 308.2	Comprehend the concepts, functions, and algorithms in Operating System
CST 308.3	Comprehend the organization and architecture of computer systems
CST 308.4	Comprehend the fundamental principles of database design and manipulation
CST 308.5	Comprehend the concepts in formal languages and automata theory

Course Name/Code : Industrial Economics & Foreign Trade/ HUT300 Course Year:2021-22

CO	description
HUT300 .1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare.
HUT300 .2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production
HUT300 .3	Determine the functional requirement of a firm under various competitive conditions.
HUT300 .4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.
HUT300 .5	Determine the impact of changes in global economic policies on the business opportunities of a firm.

Course Name/Code :Networking Lab/ CSL332 Course Year:2021-22

CO	Description
CSL332 .1	Understand Network related commands and configuration files in Linux Operating System.


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CSL332.2	Develop operating system programs using Linux System call.
CSL332.3	Implement network programming using Linux System call.
CSL332.4	Understand the basics of Network Simulator and its application.

Course Name/Code :Mini Project/ CSD 334 Course Year:2021-22

CO	Description
CSD 334.1	Identify technically and economically feasible problems
CSD 334.2	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes
CSD 334.3	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques
CSD 334.4	Prepare technical report and deliver presentation
CSD 334.5	Apply engineering and management principles to achieve the goal of the project

SEMESTER 7

Course Name/Code :Artificial Intelligence/CST 401 Course Year:2022-23

CO	Description
CST 401.1	Explain the fundamental concepts of intelligent systems and their architecture.

CST 401.2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems.
CST 401.3	Solve Constraint Satisfaction Problems using search techniques.
CST 401.4	Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems.
CST 401.5	Illustrate different types of learning techniques used in intelligent systems

Course Name/Code :Security in Computing/CST 433 Course Year:: 2022-23

CO	Description
CST 433.1	Identify the security services provided against different types of security attacks
CST 433.2	Illustrate classical encryption techniques for information hiding
CST 433.3	Illustrate symmetric/asymmetric key cryptosystems for secure communication.
CST 433.4	Explain message integrity and authentication methods in a secure communication scenario.
CST 433.5	Interpret public/secret key distribution techniques for secure communication. Identify the effects of intruders, malicious software and distributed denial of service attacks on system security

Course Name/Code :Biomedical Instrumentation/ECT 425 Course Year:: 2022-23

CO	Description
ECT 425.1	Understand various anatomical and physiological functions of the human body and about the biopotentials produced in it.


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ECT 425.2	Understand about various biopotential electrodes and measurement of potential in ECG.
ECT 425.3	Illustrate various techniques used for measurement of Blood flow, blood pressure and heart
ECT 425.4	Understand the concept of recording of EEG, EMG and ERG signals and therapeutic devices.
ECT 425.5	Describe the advances in medical imaging techniques, and understand the concepts of biotelemetry and patient safety.

Course Name/Code : IOT and Application /ECT 445 Course Year:: 2022-23

CO	Description
ECT 445.1	Understand the IoT fundamentals and architecture modeling (K1)
ECT 445.2	Understand the smart things in IoT and functional blocks
ECT 445.3	To understand the communication networks and protocols used in IoT.
ECT 445.5	To understand the cloud resources, data analysis and applications.
ECT 445.6	To apply the IoT processes in embedded applications.

Course Name/Code: Industrial Safety Engineering/ MCN401 Course Year:: 2022-23

CO	Description
MCN401.1	Describe the theories of accident causation and preventive measures of industrial accidents.

MCN401.2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping.
MCN401.3	Explain different issues in construction industries.
MCN401.4	Describe various hazards associated with different machines and mechanical material handling.
MCN401.5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards.

Course Name/Code: Compiler Lab/CSL 411 Course Year:: 2022-23

CO	Description
CSL 411.1	Implement lexical analyzer using the tool LEX.
CSL 411.2	Implement Syntax analyzer using the tool YACC.
CSL 411.3	Design NFA and DFA for a problem and write programs to perform operations on it.
CSL 411.4	Design and Implement Top-Down parser
CSL 411.5	Design and Implement Bottom-Up parsers.
CSL 411.6	Implement intermediate code for expressions

Course Name/Code: Seminar / CSQ413

Course Year:: 2022-23

CO	Description
CSQ413 .1	Identify academic documents from the literature which are related to her/his areas of interest

CSQ413 .2	Read and apprehend an academic document from the literature which is related to her/his areas of interest
CSQ413 .3	Prepare a presentation about an academic document
CSQ413 .4	Give a presentation about an academic document
CSQ413 .5	Prepare a technical report

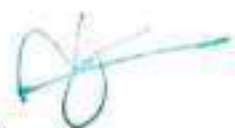
Course Name/Code:Project phase 1/CSD 415Course Year:: 2022-23

CSD 415.1	Model and solve real world problems by applying knowledge across domains
CSD 415.2	2 Develop products, processes or technologies for sustainable and socially relevant applications
CSD 415.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
CSD 415.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms
CSD 415.5	Identify technology/research gaps and propose innovative/creative solutions
CSD 415.6	Organize and communicate technical and scientific findings effectively in written and oral forms

SEMESTER 8

Course Name/Code:Distributed Computing/CST 402Course Year:: 2022-23

CO	Description
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CST 402.1	Summarize various aspects of distributed computation model and logical time
CST 402.2	Illustrate election algorithm, global snapshot algorithm and termination detection algorithm
CST 402.3	Compare token based, non-token based and quorum based mutual exclusion algorithms
CST 402.4	Recognize the significance of deadlock detection and shared memory in distributed systems
CST 402.5	Explain the concepts of failure recovery and consensus and to illustrate distributed file system architectures.

Course Name/Code:Network Security Protocol/CST 434 Course Year:: 2022-23

CO	Description
CST 434.1	Explain authentication protocols, X.509 authentication service and Public Key Infrastructure (PKI).
CST 434.2	Identify the security mechanisms in E mail security services.
CST 434.3	Summarize the network and transport layer security services provided in a secure communication scenario
CST 434.4	Describe real time communication security and application layer security protocols
CST 434.5	Explain the concepts of firewalls and wireless network security.

Course Name/Code:Client Server Architecture/CST 426 Course Year:: 2022-23



CO	Description
CST 426.1	Explain the driving forces behind the development of Client/ Server system from different perspectives.
CST 426.2	How two-tier computing and three-tier computing improves the performance of Client/Server system.
CST 426.3	<ol style="list-style-type: none"> 1. Explain the role of client in Client/Server computing and also explain the various services provided by client. 2. What is the primary motivation behind the RPC facility ? How does a RC facility makes the job of distributed application programmers simpler? 3. Implement RPC concept using suitable language/tool(Assignment)
CST 426.4	Explain Connectivity and Communication Interface Technology in Client/Server application. How does transmission protocol work in Client/Server application?.
CST 426.5	<ol style="list-style-type: none"> 1. Discuss the role of web browser for providing web service in Client/Server environment. 2. Identify and explain the social relevance of web services

Course Name/Code:Software Testing/CST 458 Course Year:: 2022-23

CO	Description
CST 458.1	List a range of different software testing techniques and be able to apply specific unit testing method to the projects using Junit.
CST 458.2	Illustrate using appropriate tools the mutation testing method for a given piece of code to identify hidden defects that can't be detected using other testing methods.
CST 458.3	Explaining graph coverage criteria in terms of control flow graph and data flow graph for a given program.
CST 458.4	Demonstrate the importance of black-box approaches in terms of domain and functional testing.
CST 458.5	Illustrate the use of PEX tool with symbolic execution.

Course Name/Code:Project/CSD416

Course Year:: 2022-23

CO	Description
CSD416.1	Model and solve real world problems by applying knowledge across domains.
CSD416.2	Develop products, processes or technologies for sustainable and socially relevant applications
CSD416.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks.
CSD416.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.
CSD416.5	Identify technology/research gaps and propose innovative/creative solutions
CSD416.6	Organize and communicate technical and scientific findings effectively in written and oral forms

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

YEAR OF INTRODUCTION 2019

FIRST & SECOND SEMESTER

EST130 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING

- CO 1 Apply fundamental concepts and circuit laws to solve simple DC electric circuits
- CO 2 Develop and solve models of magnetic circuits
- CO 3 Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
- CO 4 Describe working of a voltage amplifier
- CO 5 Outline the principle of an electronic instrumentation system
- CO 6 Explain the principle of radio and cellular communication

ESL 130 ELECTRICAL & ELECTRONICS WORKSHOP

- CO 1 Demonstrate safety measures against electric shocks.
- CO 2 Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
- CO 3 Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
- CO 4 Identify and test various electronic components
- CO 5 Draw circuit schematics with EDA tools
- CO 6 Assemble and test electronic circuits on boards
- CO 7 Work in a team with good interpersonal skills

THIRD SEMESTER

EET201 CIRCUITS AND NETWORKS

- CO 1 Apply circuit theorems to simplify and solve complex DC and AC electric networks.
- CO 2 Analyse dynamic DC and AC circuits and develop the complete response to excitations.
- CO 3 Solve dynamic circuits by applying transformation to s-domain.

CO 4 Analyse three-phase networks in Y and Δ configurations.

CO 5 Solve series /parallel resonant circuits.

CO 6 Develop the representation of two-port networks using network parameters and analyse.

EET203 MEASUREMENTS AND INSTRUMENTATION

CO 1 Identify and analyse the factors affecting performance of measuring system

CO 2 Choose appropriate instruments for the measurement of voltage, current in ac and dc measurements

CO 3 Explain the operating principle of power and energy measurement

CO 4 Outline the principles of operation of Magnetic measurement systems

CO 5 Describe the operating principle of DC and AC bridges, transducers based systems.

CO 6 Understand the operating principles of basic building blocks of digital systems, recording and display units

EET205 ANALOG ELECTRONICS

CO 1 Design biasing scheme for transistor circuits.

CO 2 Model BJT and FET amplifier circuits.

CO 3 Identify a power amplifier with appropriate specifications for electronic circuit applications.

CO 4 Describe the operation of oscillator circuits using BJT.

CO 5 Explain the basic concepts of Operational amplifier (OPAMP)

CO 6 Design and develop various OPAMP application circuits.

EEL201 CIRCUITS AND MEASUREMENTS LAB

CO 1 Analyse voltage current relations of RLC circuits

CO 2 Verify DC network theorems by setting up various electric circuits

CO 3 Measure power in a single and three phase circuits by various methods

CO 4 Calibrate various meters used in electrical systems


CO 5 Determine magnetic characteristics of different electrical devices

CO 6 Analyse the characteristics of various types of transducer systems

CO 7 Determine electrical parameters using various bridges

CO 8 Analyse the performance of various electronic devices for an instrumentation systems and, to develop the team management and documentation capabilities.

EEL203 ANALOG ELECTRONICS LAB


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- CO 1 Use the various electronic instruments and for conducting experiments.
- CO 2 Design and develop various electronic circuits using diodes and Zener diodes.
- CO 3 Design and implement amplifier and oscillator circuits using BJT and JFET.
- CO 4 Design and implement basic circuits using IC (OPAMP and 555 timers).
- CO 5 Simulate electronic circuits using any circuit simulation software.
- CO 6 Use PCB layout software for circuit design

FOURTH SEMESTER

EET202 DC MACHINES AND TRANSFORMERS

- CO 1 Acquire knowledge about constructional details of DC machines
- CO 2 Describe the performance characteristics of DC generators
- CO 3 Describe the principle of operation of DC motors and select appropriate motor types for different applications
- CO 4 Acquire knowledge in testing of DC machines to assess its performance
- CO 5 Describe the constructional details and modes of operation of single phase and three phase transformers
- CO 6 Analyse the performance of transformers under various conditions

EET204 ELECTROMAGNETIC THEORY

- CO 1 Apply vector analysis and coordinate systems to solve static electric and magnetic field problems.
- CO 2 Apply Gauss Law, Coulomb's law and Poisson's equation to determine electrostatic field parameters
- CO 3 Determine magnetic fields from current distributions by applying Biot-Savart's law and Amperes Circuital law.
- CO 4 Apply Maxwell Equations for the solution of time varying fields
- CO 5 Analyse electromagnetic wave propagation in different media.

EET206 DIGITAL ELECTRONICS

- CO 1 Identify various number systems, binary codes and formulate digital functions using Boolean algebra.
- CO 2 Design and implement combinational logic circuits.
- CO 3 Design and implement sequential logic circuits.

CO 4 Understand the architecture of 8051 microcontroller and embedded systems.

CO 5 Develop assembly level and embedded C programs in 8051 microcontroller.

EET305 SIGNALS AND SYSTEMS

CO 1 Explain the basic operations on signals and systems.

CO 2 Apply Fourier Series and Fourier Transform concepts for continuous time signals.

CO 3 Analyse the continuous time systems with Laplace Transform.

CO 4 Analyse the discrete time system using Z Transform.

CO 5 Apply Fourier Series and Fourier Transform concepts for Discrete time domain.

CO 6 Describe the concept of stability of continuous time systems and sampled data systems.

EET307 SYNCHRONOUS AND INDUCTION MACHINES

CO 1 Analyse the performance of different types of alternators.

CO 2 Analyse the performance of a synchronous motor.

CO 3 Analyse the performance of different types of induction motors.

CO 4 Describe operating principle of induction machine as generator.

CO 5 Explain the types of single phase induction motors and their working principle.

EEL331 MICROPROCESSORS AND MICROCONTROLLERS LAB

CO 1 Develop and execute assembly language programs for solving arithmetic and logical problems using microprocessor/microcontroller.

CO 2 Design and implement systems with interfacing circuits for various applications.

CO 3 Execute projects as a team using microprocessor/microcontroller for real life applications.

EEL333 ELECTRICAL MACHINES LAB II

CO 1 Analyse the performance of single phase and three phase induction motors by conducting suitable tests.

CO 2 Analyse the performance of three phase synchronous machine from V and inverted V curves.

CO 3 Analyse the performance of a three phase alternator by conducting suitable tests.

SIXTH SEMESTER

EET302 LINEAR CONTROL SYSTEMS

CO 1 Describe the role of various control blocks and components in feedback systems.

CO 2 Analyse the time domain responses of the linear systems.

CO 3 Apply Root locus technique to assess the performance of linear systems.

CO 4 Analyse the stability of the given LTI systems.

CO 5 Analyse the frequency domain response of the given LTI systems.

CO 6 Design compensators using time domain and frequency domain techniques.

EET304 POWER SYSTEMS II

CO 1 Apply the per unit scheme for any power system network and compute the fault levels.

CO 2 Analyse the voltage profile of any given power system network using iterative methods.

CO 3 Analyse the steady state and transient stability of power system networks.

CO 4 Model the control scheme of power systems.

CO 5 Schedule optimal generation scheme.

EET306 POWER ELECTRONICS

CO 1 Explain the operation of modern power semiconductor devices and its characteristics.

CO 2 Analyse the working of controlled rectifiers.

CO 3 Explain the working of AC voltage controllers, Inverters and PWM techniques.

CO 4 Compare the performance of different dc-dc converters.

CO 5 Describe basic drive schemes for ac and dc motors.

ELECTIVE-1

EET312 BIOMEDICAL INSTRUMENTATION

CO 1 Explain the basics of anatomy and physiology of human body.

CO 2 Explain different techniques for the measurement of various physiological parameters.

CO 3 Describe modern imaging techniques for medical diagnosis

CO 4 Identify the various therapeutic equipments used in biomedical field

CO 5 Discuss the patient safety measures and recent advancements in medical field.

EET322 RENEWABLE ENERGY SYSTEMS

CO 1 Describe the environmental aspects of renewable energy resources.

CO 2 Explain the operation of various renewable energy systems.

CO 3 Design solar PV systems.

CO 4 Explain different emerging energy conversion technologies and storage.

SEVENTH SEMESTER

EET401 ADVANCED CONTROL SYSTEMS

- CO 1 Develop the state variable representation of physical systems
- CO 2 Analyse the performance of linear and nonlinear systems using state variable approach
- CO 3 Design state feedback controller for a given system
- CO 4 Explain the characteristics of nonlinear systems
- CO 5 Apply the tools like describing function approach or phase plane approach for assessing the performance of nonlinear systems
- CO 6 Apply Lyapunov method for the stability analysis of physical systems.

PROGRAM ELECTIVE-II

EET413 ELECTRIC DRIVES

- CO 1 Describe the transient and steady state aspects electric drives
- CO 2 Apply the appropriate configuration of controlled rectifiers for the speed control of DC motors
- CO 3 Analyse the operation of chopper-fed DC motor drive in various quadrants
- CO 4 Illustrate the various speed control techniques of induction motors
- CO 5 Examine the vector control of induction motor drives
- CO 6 Distinguish different speed control methods of synchronous motor drives

EET423 DIGITAL CONTROL SYSTEMS

- CO 1 Describe the various control blocks and components of digital control systems.
- CO 2 Analyse sampled data systems in z-domain.
- CO 3 Design a digital controller/ compensator in frequency domain.
- CO 4 Design a digital controller/ compensator in time domain.
- CO 5 Apply state variable concepts to design controller for linear discrete time system.

EEQ413 SEMINAR

- CO1 Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).
- CO2 Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
- CO3 Prepare a presentation about an academic document (Cognitive knowledge level: Create).

CO4 Give a presentation about an academic document (Cognitive knowledge level:Apply).

CO5 Prepare a technical report (Cognitive knowledge level:Create).

EED415 PROJECT PHASE I

CO1 Model and solve real world problems by applying knowledge across domains(Cognitive knowledge level: Apply).

CO2 Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).

CO3 Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).

CO4 Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).

CO5 Identify technology/research gaps and propose innovative/creative solutions(Cognitive knowledge level: Analyze).

CO6 Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).

EEL411 CONTROL SYSTEMS LAB

CO 1 Demonstrate the knowledge of simulation tools for control system design.

CO 2 Develop the mathematical model of a given physical system by conducting appropriate experiments.

CO 3 Analyze the performance and stability of physical systems using classical and advanced control approaches.

CO 4 Design controllers for physical systems to meet the desired specifications.

EIGHTH SEMESTER

EET402 ELECTRICAL SYSTEM DESIGN AND ESTIMATION

CO 1 Explain the rules and regulations in the design of components for medium and high voltage installations.

CO 2 Design lighting schemes for indoor and outdoor applications.

CO 3 Design low/medium voltage domestic and industrial electrical installations.

CO 4 Design, testing and commissioning of 11 kV transformer substation.

CO 5 Design electrical installations in high rise buildings.



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Course Name: HUT 200 Professional Ethics

Regulation: 2019 Scheme

COURSE OUTCOME

HUT 200.1	Understand the core values that shape the ethical behaviour of a professional.
HUT 200.2	Adopt a good character and follow an ethical life.
HUT 200.3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
HUT 200.4	Solve moral and ethical problems through exploration and assessment by established experiments.
HUT 200.5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.

Course Name: MCN 201 Sustainable Engineering

Regulation: 2019 Scheme

COURSE OUTCOME

MCN 201.1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
MCN 201.2	Explain the different types of environmental pollution problems and their sustainable solutions
MCN 201.3	Discuss the environmental regulations and standards
MCN 201.4	Outline the concepts related to conventional and non-conventional energy
MCN 201.5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles

Course Name: CSL 201 Data Structures Lab

Regulation: 2019 Scheme

COURSE OUTCOME

CSL 201.1	Write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements
CSL 201.2	Write a time/space efficient program to sort a list of records based on a given key in the record
CSL 201.3	Examine a given Data Structure to determine its space complexity and time

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	complexities of operations on it
CSL 201.4	Design and implement an efficient data structure to represent given data
CSL 201.5	Write a time/space efficient program to convert an arithmetic expression from one notation to another
CSL 201.6	Write a program using linked lists to simulate Memory Allocation and Garbage Collection

Course Name: CSL 203 Object Oriented Programming Lab(In Java)	Regulation: 2019 Scheme
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COURSE OUTCOME

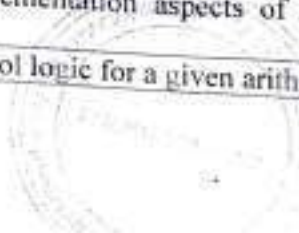
CSL 203.1	Implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java
CSL 203.2	Implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files
CSL 203.3	Implement robust application programs in Java using exception handling
CSL 203.4	Implement application programs in Java using multithreading and database
CSL 203.5	Write a time/space efficient program to convert an arithmetic expression from one notation to another
CSL 203.6	Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java

Course Name: CST 202 Computer Organization and Architecture	Regulation: 2019 Scheme
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COURSE OUTCOME

CST 202.1	Recognize and express the relevance of basic components, I/O organization and pipelining schemes in a digital computer
CST 202.2	Explain the types of memory systems and mapping functions used in memory systems
CST 202.3	Demonstrate the control signals required for the execution of a given instruction
CST 202.4	Illustrate the design of Arithmetic Logic Unit and explain the usage of registers in it
CST 202.5	Explain the implementation aspects of arithmetic algorithms in a digital computer
CST 202.6	Develop the control logic for a given arithmetic problem

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Course Name: CST 204 Database Management Systems	Regulation: 2019 Scheme
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COURSE OUTCOME

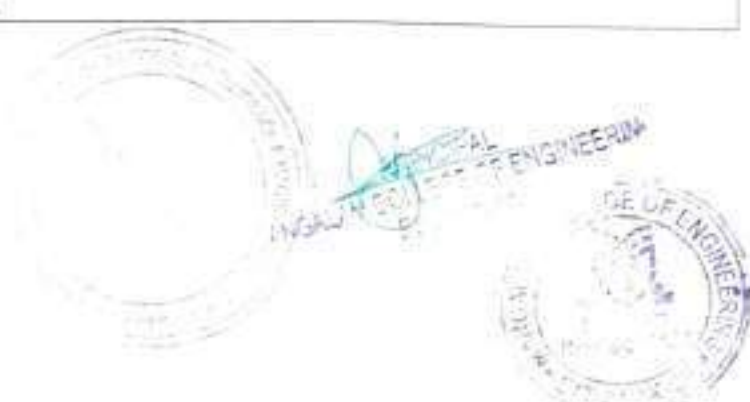
CST 204.1	Summarize and exemplify fundamental nature and characteristics of database systems
CST 204.2	Explain the types of memory systems and mapping functions used in memory systems
CST 204.3	Model real word scenarios given as informal descriptions, using Entity Relationship diagrams.
CST 204.4	Model and design solutions for efficiently representing and querying data using relational model
CST 204.5	Discuss and compare the aspects of Concurrency Control and Recovery in Database systems
CST 204.6	Explain various types of NoSQL databases

Course Name: CST 206 Operating Systems	Regulation: 2019 Scheme
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COURSE OUTCOME

CST 206.1	Explain the relevance, structure and functions of Operating Systems in computing devices.
CST 206.2	Illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems.
CST 206.3	Explain process synchronization in Operating Systems and illustrate process synchronization mechanisms using Mutex Locks, Semaphores and Monitors
CST 206.4	Explain any one method for detection, prevention, avoidance and recovery for managing deadlocks in Operating Systems:
CST 206.5	Explain the memory management algorithms in Operating Systems.
CST 206.6	Explain the security aspects and algorithms for file and storage management in Operating Systems.

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Course Name: EST 200 Design and Engineering

Regulation: 2019 Scheme

COURSE OUTCOME

EST 200.1	Explain the different concepts and principles involved in design engineering.
EST 200.2	Apply design thinking while learning and practicing engineering.
EST 200.3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.

Course Name: MCN 202 Constitution of India

Regulation: 2019 Scheme

COURSE OUTCOME

MCN 202.1	Explain the background of the present constitution of India and features.
MCN 202.2	Utilize the fundamental rights and duties.
MCN 202.3	Understand the working of the union executive, parliament and judiciary.
MCN 202.4	Understand the working of the state executive, legislature and judiciary.
MCN 202.5	Utilize the special provisions and statutory institutions.
MCN 202.6	Show national and patriotic spirit as responsible citizens of the country

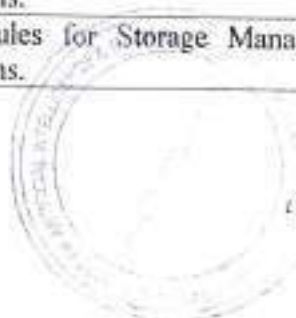
Course Name: CST 206 Operating Systems Lab

Regulation: 2019 Scheme

COURSE OUTCOME

CST 206.1	Illustrate the use of systems calls in Operating Systems.
CST 206.2	Implement Process Creation and Inter Process Communication in Operating Systems.
CST 206.3	Implement First Come First Served, Shortest Job First, Round Robin and Priority- based CPU Scheduling Algorithms.
CST 206.4	Illustrate the performance of First In First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms.
CST 206.5	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems.
CST 206.6	Implement modules for Storage Management and Disk Scheduling in Operating Systems.

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Course Name: EST 102 Programming in C	Regulation: 2019 Scheme
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COURSE OUTCOME

EST 102.1	Analyse a computational problem and develop an algorithm/flowchart to find its solution
EST 102.2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
EST 102.3	Write readable C programs with arrays, structure or union for storing the data to be processed
EST 102.4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
EST 102.5	Write readable C programs which use pointers for array processing and parameter passing
EST 102.6	Develop readable C programs with files for reading input and storing output

Course Name: CST 201 Data Structures	Regulation: 2019 Scheme
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COURSE OUTCOME

CST 201.1	Design an algorithm for a computational task and calculate the time/space complexities of that algorithm
CST 201.2	Identify the suitable data structure (array or linked list) to represent a data item required to be processed to solve a given computational problem and write an algorithm to find the solution of the computational problem
CST 201.3	Write an algorithm to find the solution of a computational problem by selecting an appropriate data structure (binary tree/graph) to represent a data item to be processed
CST 201.4	Store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set
CST 201.5	Select appropriate sorting algorithms to be used in specific circumstances
CST 201.6	Design and implement Data Structures for solving real world problems efficiently

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Course Name: CST 203 Logic System Design

Regulation: 2019 Scheme

COURSE OUTCOME

CST 203.1	Illustrate decimal, binary, octal, hexadecimal and BCD number systems, perform conversions among them and do the operations - complementation, addition, subtraction, multiplication and division on binary numbers
CST 203.2	Simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates
CST 203.3	Design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker and design the Programmable Logic Devices - ROM and PLA.
CST 203.4	Design sequential circuits - Registers, Counters and Shift Registers.
CST 203.5	Use algorithms to perform addition and subtraction on binary, BCD and floating point numbers (Cognitive

Course Name: CST 205 Object Oriented Programming using Java

Regulation: 2019 Scheme

COURSE OUTCOME

CST 205.1	Write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism
CST 205.2	Utilise datatypes, operators, control statements, built in packages & interfaces, Input/Output Streams and Files in Java to develop programs
CST 205.3	Illustrate how robust programs can be written in Java using exception handling mechanism
CST 205.4	Write application programs in Java using multithreading and database connectivity
CST 205.5	Write Graphical User Interface based application programs by utilising event handling features and Swing in Java

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Course Name: AIL 202 DBMS Lab

Regulation: 2019 Scheme

COURSE OUTCOME

AIL 206.1	Design database schema for a given real world problem-domain using standard design modeling approaches.
AIL 206.2	Construct queries using SQL for database creation, interaction, modification, and updation
AIL 206.3	Design and implement triggers and cursors.
AIL 206.4	Implement procedures, functions, and control structures using PL/SQL
AIL 206.5	Perform CRUD operations in NoSQL Databases and develop database applications using front-end tools and back-end DBMS.

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MANGALAM COLLEGE OF ENGINEERING
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Department of Civil Engineering

MANGALAM COLLEGE OF ENGINEERING

COURSE OUTCOMES OF ALL COURSES (2019 SCHEME)

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Course Name: EST 100 Engineering Mechanics

Regulation: 2019 Scheme

COURSE OUTCOMES

COs	Description	Taxonomy
EST100.1	Explain principles and theorems related to rigid body mechanics	Understand
EST100.2	Describe the components of system of forces acting on the rigid body	Understand
EST100.3	Apply the conditions of equilibrium to various practical problems involving different force system.	Apply
EST100.4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.	Apply
EST100.5	Brief about dynamics and mechanical vibrations, solve simple numerical related to it	Apply

Course Name: ESL120 Basics of Civil and Mechanical Engineering workshop

Regulation: 2019 Scheme

COURSE OUTCOMES

COs	Description	Taxonomy
ESL120.1	Name and explain the use of various tools and devices for various civil engineering field measurements	Remember
ESL120.2	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work	Apply
ESL120.3	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing..	Apply
ESL120.4	Identify Basic Mechanical workshop operations in accordance with the material and objects	Apply
ESL120.5	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades	Apply
ESL120.6	Apply appropriate safety measures with respect to the mechanical workshop trades	Apply



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Course Name: EST120 Basics of Civil Engineering	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
EST120.1	Recall the role of civil engineer in society to relate the various disciplines of Civil Engineering and types of buildings, area, and its functions, rules and regulations.	Remember
EST120.2	Describe the importance, objectives and principles of surveying and to explain different types of building materials used for construction	understand
EST120.3	Describe about the building construction, and summarize about the basic infrastructure services and green buildings.	Remember



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Course Name: CET 201 MECHANICS OF SOLIDS	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET201.1	Recall the fundamental terms and theorems associated with mechanics of linear elastic deformable bodies.	Remember
CET201.2	Apply the principles of solid mechanics to calculate internal stresses/strains, stress resultants and strain energies in structural elements subjected to different loading conditions.	Apply
CET201.3	Calculate and draw bending moment and shear force in a loaded beam and to find the point of contraflexure	Apply
CET201.4	Learn the theory of simple bending and to calculate the various parameters associated with bending	Apply
CET201.5	Locate Principal Planes and calculate Principal Stresses for 2D problems, Explain the concept of column buckling and torsion and strain energy in circular and hollow circular shafts.	Apply


Course Name: CET 203 FLUID MECHANICS AND HYDRAULICS	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET203.1	Recall the relevant principles of hydrostatics and hydraulics of pipes and open channels	Understand
CET203.2	Describe about buoyancy and flotation and hydrodynamics of fluid motion in 1,2 and 3 Dimensions	Apply
CET203.3	Apply Bernoulli's equation to fluid flow problems involving venturimeter, orifice meter, pitot tube, orifices, mouthpieces and analyze the flow through pipes and the major and minor energy losses	Apply
CET203.4	Compute flow in open channels and discharges in notches and weirs	Apply
CET203.5	Compute Specific energy and describe about gradually and rapidly varied flow with its applications.	Apply




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Course Name: CET 205 Surveying & Geomatics	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET205.1	Describe about surveying, levelling, various instrument used for it and brief about contouring.	Understand
CET205.2	Apply surveying techniques for computation of area-volume and sketching mass diagram detail about theodolite survey triangulation techniques	Apply
CET205.3	Apply different methods of traverse surveying and traverse balancing, theory and computation of errors.	Apply
CET205.4	Apply the basic knowledge of setting out of different types of curves	Understand
CET205.5	Employ surveying techniques using advanced surveying equipments	Understand

Course Name: CEL201 Civil Engineering Planning & Drafting Lab	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CEL201.1	Draw, prepare and interpret the various building components and familiarize with Kerala building Rules.	Apply
CEL201.2	Draw the partial elevations of the Steel truss, the connections involved in it and design of Reinforced concrete staircase.	Apply
CEL201.3	Develop the plan, section and elevation of single-storied and double storied buildings from given line sketches	Apply
CEL201.4	Plan and develop a line sketches and working drawings of single-storied RCC residential buildings as per functional requirements	Apply
CEL201.5	Develop site plan of a given building using Kerala Building Rules	Apply
CEL201.6	Prepare plan, elevation, and section of a building using Auto CADD software	Apply



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Course Name: CEL 203 Surveying Lab	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CEL203.1	Use conventional surveying tools such as chain/tape and compass for plotting and area determination	Apply
CEL203.2	Apply levelling principles in field	Apply
CEL203.3	Solve triangulation problems using theodolite	Apply
CEL203.4	Employ total station for field surveying	Apply
CEL203.5	Demonstrate the use of distomat and handheld GPS	Apply

Course Name: MCN 202 SUSTAINABLE ENGINEERING	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
MCN 201.1	Understand the relevance and the concept of sustainability and the global initiatives in this direction	Understand
MCN 201.2	Explain the different types of environmental pollution problems and their sustainable solutions	Understand
MCN 201.3	Discuss the environmental regulations and standards	Remember
MCN 201.4	Outline the concepts related to conventional and non-conventional energy	Remember
MCN 201.5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles	Understand


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Course Name: CET 202 Engineering Geology	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET202 .1	Recall the fundamental concepts of surface processes, subsurface process, minerals, rocks, groundwater and geological factors in civil engineering constructions.	Understand
CET202 .2	Identify and describe the surface processes, subsurface process, earth materials, groundwater and geological factors in civil engineering constructions.	Understand
CET202 .3	Apply the basic concepts of surface and subsurface processes, minerals, rocks, groundwater and geological characteristics in civil engineering constructions.	Apply
CET202 .4	Analyze and classify geological processes and earth materials.	Understand
CET202 .5	Evaluation of geological factors in civil engineering constructions.	Understand

Course Name: CET206Transportation Engineering	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET206 .1	Apply the basic principles of Highway planning and design highway geometric elements	Apply
CET206 .2	Apply standard code specifications in judging the quality of highway materials; designing of flexible pavements	Apply
CET206 .3	Explain phenomena in road traffic by collection, analysis and interpretation of traffic data through surveys; creative design of traffic control facilities	Apply
CET206.4	Understand about railway systems, tunnel, harbour and docks	Remember
CET206 .5	Express basics of airport engineering and design airport elements	Apply

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Course Name: CET204 Geotechnical Engineering I	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET204.1	Estimate basic soil properties using three phase system	Apply
CET204.2	Calculate the engineering properties of soil by applying the laboratory test results and the fundamental concepts of soil mechanics.	Apply
CET204.3	Study the principle of effective stress, various methods to find stress distribution and apply the same in solving numericals.	Apply
CET204.4	Explain the difference between compaction and consolidation in detail about the laboratory tests to solve numericals associated with it	Apply
CET204.5	Explain the practical applications of shear strength of soil, its laboratory tests, stability of slopes and solving the numerical problems associated with it.	Analyse

Course Name: CEL202 Material testing Lab I	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CEL202.1	Conduct tension test on steel, aluminium, copper and brass	Apply
CEL202.2	Conduct compression tests on spring, wood and concrete	Apply
CEL202.3	Conduct flexural and torsion test to determine elastic constants	Apply
CEL202.4	Determine hardness of metals	Apply



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Course Name: HUT200 Professional Ethics	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
HUT200.1	Understand the core values that shape the ethical behaviour of a professional.	Understand
HUT200.2	Adopt a good character and follow an ethical life.	Understand
HUT200.3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.	Explain
HUT200.4	Solve moral and ethical problems through exploration and assessment by established experiments.	Apply
HUT200.5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.	Apply

Course Name: EST200 DESIGN AND ENGINEERING	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
EST200.1	Explain the different concepts and principles involved in design engineering	Explain
EST200.2	Apply design thinking while learning and practicing engineering.	Apply
EST200.3	Explain different aspects of design communication, modeling, prototyping and proofing.	Explain
EST200.4	Apply design engineering concepts based on Learning and Problem-based Learning.	Apply
EST200.5	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.	Apply



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Course Name: MCN202 Constitution of India	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
MCN202.1	Explain the background of the present constitution of India and features.	Explain
MCN202.2	Utilize the fundamental rights and duties.	Understand
MCN202.3	Understand the working of the union executive, parliament and judiciary.	Understand
MCN202.4	Understand the working of the state executive, legislature and judiciary.	Understand
MCN202.5	Utilize the special provisions, statutory institutions and the federal system.	Understand



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Course Name: CET 301 STRUCTURAL ANALYSIS - I	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET301.1	Apply the principles of solid mechanics to analyse trusses and various methods to determine deflections in statically determinate structures	Apply
CET301.2	Identify the problems with static indeterminacy and tackle such problems by means of the method of consistent deformations and energy principles.	Apply
CET301.3	Apply specific methods such as slope deflection and moment distribution methods of structural analysis for typical structures with different characteristics.	Apply
CET301.4	Apply suitable methods of analysis for various types of structures including cables and suspension bridges.	Apply
CET301.5	Analyse the effects of moving loads on structures using influence lines.	Analyse


Course Name: CET 303 DESIGN OF CONCRETE STRUCTURES	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET303.1	Understand the fundamental concepts of limit state design and code provisions for design of concrete members under bending, shear, compression and torsion.	Understand
CET303.2	Analyse reinforced concrete sections to determine the ultimate capacity of beams in bending, shear and compression.	Analyse
CET303.3	Design and detail slab and stair case using IS code provisions.	Apply
CET303.4	Design and detail columns using IS code and SP 16 design charts.	Apply
CET303.5	Design and detail of footings and explain the criteria for earthquake resistant design of structures.	Apply



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Course Name: CET 305 GEOTECHNICAL
ENGINEERING – II

Regulation: 2019 Scheme

COURSE OUTCOMES

COs	Description	Taxonomy
CET305.1	Analyse the earth pressure, attain the knowledge of various theories and understand the basics of foundation	Analyse
CET305.2	Understand the bearing capacity of shallow foundations and the factors affecting bearing capacity	Understand
CET305.3	Analyse the causes of different settlements and understand the basic concept of footing and raft foundation	Analyse
CET305.4	Differentiate the characteristics of pile and well foundation	Understand
CET305.5	Understand the site investigating methodologies and soil exploration techniques	Understand

Course Name: CET 307HYDROLOGY & WATER
RESOURCES ENGINEERING


Regulation: 2019 Scheme

COURSE OUTCOMES

COs	Description	Taxonomy
CET307.1	Understand the hydrologic cycle and the mechanism of precipitation along with the measurement of precipitation, infiltration and evaporation.	Understand
CET307.2	Compute the amount of run-off after precipitation using hydrograph analysis	Apply
CET307.3	Understand the types, methods and benefits of irrigation and they will be able to compute the water requirements of crops along with various deficiencies	Understand
CET307.4	Describe and apply the principles of reservoir engineering to estimate the capacity of reservoirs and their useful life.	Apply
CET307.5	Demonstrate the principles of groundwater engineering and apply them	Apply



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Course Name: CET 309 CONSTRUCTION TECHNOLOGY AND MANAGEMENT	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET309.1	Describe the properties of materials used in construction	Understand
CET309.2	Determine the properties of concrete and understand the various elements of building construction	Understand
CET309.3	Demonstrate the technologies of various construction processes	Apply
CET309.4	Understand about contents of project report, tenders and contracts.	Understand
CET309.5	Apply scheduling techniques in project planning and control	Apply

Course Name: MCN 301 DISASTER MANAGEMENT	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
MCN301.1	Define and use various terminologies used in disaster management parlance and organise each of these terms in relation to the disaster management cycle	Remember
MCN301.2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment	Understand
MCN301.3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk and response for it	Apply
MCN301.4	Discuss about the stakeholder's role, communication and capacity related issues	Understand
MCN301.5	Explain the various legislations and best practices for disaster management and risk reduction at national and international level	Understand



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Course Name: CEL 331 MATERIAL TESTING LAB II	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CEL331.1	Determine the different physical properties of various construction materials such as cement, sand and coarse aggregate and compare the values with IS values	Apply
CEL331.2	Develop the concrete mix proportioning for various grades of concrete	Apply
CEL331.3	Determine the various fresh and hardened properties of concrete	Apply
CEL331.4	Determine the properties of various construction materials such as bricks, floor and roof tiles as per IS codal provisions	Apply
CEL331.5	Analyse the hardened properties of concrete by using non-destructive tests.	Apply

Course Name: CEL 333 GEOTECHNICAL ENGINEERING LAB	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CEL333.1	Identify and classify soil based on standard geotechnical experimental methods.	Apply
CEL333.2	Estimate the physical and index properties of soil using various tests	Apply
CEL333.3	Perform and analyze permeability tests.	Apply
CEL333.4	Interpret engineering behavior of soils based on test viz. compaction, CBR and in-place density test for fill quality control in the field.	Apply
CEL333.5	Evaluate the strength of soil by performing various tests viz. direct shear test, unconfined compressive strength test and triaxial shear test.	Apply



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Course Name: CET 302 Structural Analysis II	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET302.1	Understand the principles and applications of plastic theory and analysis for framed structures subjected to vertical loads.	Understand
CET302.2	Analyse structures by force method and frames subjected to wind load by approximate methods and flexibility method	Analyse
CET302.3	Apply stiffness method to analyse structures	Apply
CET302.4	Apply direct stiffness method to analyse structures.	Apply
CET302.5	Remember basic dynamics, understand the basic principles of structural dynamics and apply the same to simple structures.	Remember

Course Name: CET 304 Environmental Engineering	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET304.1	Design population, Water demand estimation and planning for collection and conveyance of water and wastewater.	Analyse
CET304.2	Study of Unit Processes and design of sedimentation unit.	Understand
CET304.3	Planning and design of filtration unit and design of water distribution network.	Create
CET304.4	Study of primary, secondary and tertiary treatment systems and design of activated sludge plant.	Understand
CET304.5	Design of septic tank and study of natural water treatment systems.	Analyse


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Course Name: CET 306 Design of Hydraulic Structures	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET306.1	Elucidate about the different components of hydraulic structures and its functions with Bligh's and Khosla's theory	Understand
CET306.2	Describe the features of canal structures and perform the design of alluvial canals	Understand
CET306.3	Prepare the scaled drawings of different minor irrigation structures	Apply
CET306.4	Describe the design principles and features of dams and perform the stability analysis of gravity dams	Apply
CET306.5	Describe the design principles and failures of Earth, Arch Dams and IS I and II spillway types.	Apply

Course Name: HUT 300 Industrial Economics & Foreign Trade	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
HUT300.1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare.	Understand
HUT300.2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production.	Apply
HUT300.3	Determine the functional requirement of a firm under various competitive conditions.	Apply
HUT300.4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.	Analyse
HUT300.5	Determine the impact of changes in global economic policies on the business opportunities of a firm.	Apply



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Course Name: CET 352 Advanced Concrete Technology	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET352.1	Understand the properties and testing of concrete materials and different types of admixtures	Understand
CET352.2	Design concrete mix using IS code	Apply
CET352.3	Describe the procedure of determining the properties of fresh and hardened concrete	Understand
CET352.4	Understand the durability properties and non destructive testing of concrete.	Understand
CET352.5	Describe the various special types of concrete.	Understand

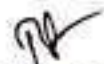
Course Name: CET 362 ENVIRONMENTAL IMPACT ASSESSMENT	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET362.1	Understand the EIA acts and the need for minimizing the environmental impacts of developmental activities	Understand
CET362.2	Understand environmental legislation & clearance procedure in the country	Understand
CET362.3	Apply various methodologies for assessing the environmental impacts of any developmental activity	Apply
CET362.4	Prepare an environmental impact assessment report	Apply
CET362.5	Understand the case studies related to EIA	Understand



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Course Name: CET 332 TRAFFIC ENGINEERING AND MANAGEMENT

Regulation: 2019 Scheme

COURSE OUTCOMES

COs	Description	Taxonomy
CET332.1	Identify the relationship among various traffic stream variables	Apply
CET332.2	Apply traffic management measures and regulations so as to solve issues related to traffic flow in road network.	Apply
CET332.3	Explain the concept of capacity and LOS and its estimation for various traffic facilities	Understand
CET332.4	Identify the need for intersection control and design of various types	Apply
CET332.5	Analyse causes of road accidents and suggest preventive measures	Analyse

Course Name: CEL 332 Transportation Engineering Lab

Regulation: 2019 Scheme

COURSE OUTCOMES

COs	Description	Taxonomy
CEL332.1	Analyse the suitability of soil as a pavement subgrade material	Apply
CEL332.2	Assess the suitability of aggregates as a pavement construction material	Apply
CEL332.3	Characterize bitumen based on its properties so as to recommend it as a pavement construction material.	Apply
CEL332.4	Design bituminous mixes for pavement layers	Apply
CEL332.5	Assess functional adequacy of pavements based on roughness of pavement surface.	Apply



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Course Name: CEL 334 CIVIL ENGINEERING SOFTWARE LAB	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CEL334.1	Analysis and design of steel and RCC elements using any standard software used in the industry.	Apply
CEL334.2	Preparation of structural drawings of slabs, beams and foundation units	Apply
CEL334.3	Study of Building Information Modelling tools	Apply
CEL334.4	Use of Project Management Software (MS Project/Primavera)	Apply
CEL334.5	Field exercise to use Total Station	Apply

Course Name: CET 308 COMPREHENSIVE COURSE WORK	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET308.1	Recall the fundamental concepts of mechanics of solids	Remember
CET308.2	Recall the fundamentals of fluid mechanics	Remember
CET308.3	Recall the fundamental concepts of surveying and geomatics	Remember
CET308.4	Recall the fundamental concepts of geotechnical engineering	Remember
CET308.5	Recall the fundamental concepts of construction and concrete technology	Remember


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Course Name: CET 401 Design of Steel Structures	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET401.1	Design bolted and welded connections	Apply
CET401.2	Design tension members and beams using the IS specifications	Apply
CET401.3	Design columns under axial loads using IS specifications	Apply
CET401.4	Design beams and plate girders	Apply
CET401.5	Assess loads on a truss and design purlins	Apply

Course Name: CEL 411 Environmental Engineering Lab	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CEL411.1	Develop a working knowledge about the laboratory analysis used for the determination of physical, chemical and biological properties of water and waste water.	Analyse
CEL411.2	Evaluate the analysis results and classify water and wastewater as per IS specifications.	Apply
CEL411.3	Assess the quality of water and wastewater for various practical purposes.	Apply

Course Name: CEQ413 Seminar	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CEQ413.1	Identify academic documents from the literature which are related to her/his areas of interest	Create
CEQ413.2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest	Create
CEQ413.3	Prepare a presentation about an academic document.	Create
CEQ413.4	Give a presentation about an academic document	Create
CEQ413.5	Prepare a technical report	Create


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Course Name: CED 415 Project Phase I	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CED415.1	Model and solve real world problems by applying knowledge across domains	Create
CED415.2	Develop products, processes or technologies for sustainable and socially relevant applications	Create
CED415.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks	Create
CED415.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms	Create
CED415.5	Identify technology/research gaps and propose innovative/creative solutions	Create

Course Name: CET 423 GROUND IMPROVEMENT TECHNIQUES	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET423.1	Classify different ground improvement methods based on soil suitability	Understand
CET423.2	Outline the basic concept / design aspects of various ground improvement methods	Understand
CET423.3	Identify the construction procedure of different ground improvement methods	Apply
CET423.4	Identify the suitability of earth reinforcement, soil nailing and application of geosynthetics.	Apply
CET423.5	Choose different application for grouting and thermal soil stabilization.	Apply

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Course Name: CET 413 Prestressed Concrete	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET413.1	Develop a working knowledge of essential concepts in prestressed concrete	Apply
CET413.2	Analyse a prestressed member section	Analyse
CET413.3	Estimate losses of prestressing	Understand
CET413.4	Design a prestressed member in accordance with standard procedures	Apply
CET413.5	Evaluate the behaviour and design of end blocks and composite members and their applications	Apply

Course Name: CET445 NATURAL DISASTERS AND MITIGATION	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET445.1	Explain interaction between subsystems of earth that give rise to hazards and their potential for disasters	Understand
CET445.2	Explain the evolving concepts and thoughts of management of hazards and disasters	Understand
CET445.3	Analyse the causes behind natural disasters and evaluate their magnitude and impacts	Analyse
CET445.4	Create management plans for hazards and disasters, and understand the roles of agencies involved.	Apply
CET445.5	Explain the concept of sustainable development and EIA and their role in mitigating disasters	Understand



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Course Name: CET 402 QUANTITY SURVEY AND VALUATION	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET402.1	Understand about the basic principle of quantity surveying, estimate, items of works and rules and method of measurement as per IS 1200 specifications.	Understand
CET402.2	Understand about the schedule of rates, detailed specification as per CPWD and analysis of rate according to DSR and DAR.	Understand
CET402.3	Estimate the detailed quantity of materials for RCC building works, road works, sanitary and water supply works.	Apply
CET402.4	Assess the value of the property and understand the facts about valuation and its methods.	Apply

Course Name: CET424 GEO ENVIRONMENTAL ENGINEERING	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET424.1	Recognize the geo-environmental problems created by waste and its necessity of disposal.	Apply
CET424.2	Understand about the contaminants and its impacts on the environment	Understand
CET424.3	Understand the use of landfill and geo membranes.	Understand
CET424.4	Know about the leachate collection, drainage collection, barrier layer assessment and their design consideration.	Understand
CET424.5	Describe the concept of soil remediation. And stability of landfill.	Understand

Course Name: MCN 401 INDUSTRIAL SAFETY ENGINEERING	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
MCN401.1	Describe the theories of accident causation and preventive measures of industrial accidents	Understand
MCN401.2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping	Understand
MCN401.3	Explain different issues in construction industries.	Understand
MCN401.4	Describe various hazards associated with different machines and mechanical material handling.	Understand
MCN401.5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards.	Apply


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Course Name: CET414Advanced Structural Design	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET414.1	Design the retaining structures	Apply
CET414.2	Design the water tanks as per IS 3370-2009	Apply
CET414.3	Design slabs and flat slabs using yield line theory	Apply
CET414.4	Design compression and tension steel members as per IS codes	Apply
CET414.5	Design continuous beams and portal frames	Apply

Course Name: CET454Construction methods and Equipments	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET454.1	Explain the various construction procedures for sub structures and super structures	Understand
CET454.2	Describe the various construction activities involved in underground and under water construction	Understand
CET454.3	Demonstrate basic knowledge about construction equipment and machineries	Understand
CET454.4	Explain the equipment used for production of aggregates and concreting	Understand
CET454.5	Select construction equipment appropriate to tasks.	Apply



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Course Name: CET416 Bridge Engineering	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET416.1	Prepare General Arrangement Design of bridges.	Apply
CET416.2	Explain various loads on bridge and methods of structural analysis of bridges.	Understand
CET416.3	Design culverts and common bridge superstructures such as RCC Solid slab and T-beam & slab and its reinforcement detailing.	Apply
CET416.4	Design composite superstructure such as PSC I girders and steel plate girders with RCC deck slab.	Apply
CET416.5	Identify various bearings and design of bridge substructures and foundation.	Apply

CourseName:CET456REPAIR AND REHABILITATION OF BUILDINGS	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET456.1	Recall the basics ideas and theories associated with Concrete technology and Masonry structures.	Remember
CET456.2	Understand the need and methodology of repair and rehabilitation of structures, the various mechanisms used, and tools for diagnosis of structures	Understand
CET456.3	Identifying the criterions for repairing / maintenance and the types and properties of repair materials used in site. Learn various techniques for repairing damaged and corroded structures	Apply
CET456.4	Proposing wholesom solutions for maintenance/rehabilitation and applying methodologies for repairing structures or demolishing structures.	Apply
CET456.5	Analyse and assess the damage to structures using various tests	Analyse



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CourseName: CET476 BUILDING SERVICES	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET476.1	Recommend appropriate water management services	Evaluate
CET476.2	Develop a system for the management of waste	Apply
CET476.3	Identify suitable electrical and mechanical building services	Apply
CET476.4	Recall the various firefighting services and Choose relevant materials and practices for good acoustics	Remember
CET476.5	Propose sustainable construction materials, methods, and practices	Create

CourseName: CET418 EARTHQUAKE RESISTANT DESIGN	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET418.1	Formulate appropriate SDOF models of simple structural systems under dynamic loads apply them to the solution of engineering problems.	Create
CET418.2	Analyze and interpret the dynamic response of SDOF systems for various dynamic inputs.	Analyse
CET418.3	Develop appropriate mathematical models for 2 DOF systems MDOF shear building models and estimate the natural frequencies and vibration modes for these same.	Apply
CET418.4	Explain the basics of engineering seismology, ground motion characteristics, behavior of structures to ground motion and appreciate the various principles of seismic design philosophy	Understand
CET418.5	Apply the provisions of various Indian seismic design standards for the estimation of seismic demand over structures.	Apply



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CourseName: CET468CLIMATE CHANGE AND SUSTAINABILITY	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CET468.1	Explain the fundamental concepts of climate and its influencing factors	Understand
CET468.2	Explain the factors affecting climate change and the harmful impacts due to climate change	Understand
CET468.3	Discuss the problems due to urbanization and the need for sustainable development	Understand
CET468.4	Demonstrate the various adaptation and mitigation techniques for combating climate change	Understand
CET468.5	Discuss multilateral agreements on climate change, Case studies on Climate change	Understand


CourseName: CED416PROJECT PHASE II	Regulation: 2019 Scheme
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COURSE OUTCOMES

COs	Description	Taxonomy
CED416.1	Model and solve real world problems by applying knowledge across domains	Create
CED416.2	Develop products, processes or technologies for sustainable and socially relevant applications	Create
CED416.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks	Create
CED416.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms	Create
CED416.5	Identify technology/research gaps and propose innovative/creative solutions	Create
CED416.6	Organize and communicate technical and scientific findings effectively in written and oral forms	Create


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CourseName: CET404COMPREHENSIVE VIVA
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Regulation: 2019 Scheme

COURSE OUTCOMES

COs	Description	Taxonomy
CET404.1	Prepare for a competitive examination	Remember
CET404.2	Analyze the comprehensive knowledge gained in basic courses in the field of Civil Engineering	Apply



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COURSE OUTCOMES of 2019 CURRICULUM

SEMESTER I	
COURSE: MAT 101 LINEAR ALGEBRA AND CALCULUS	
MAT101.1	Solve the consistent system of linear equations and to determine the nature of quadratic form.
MAT101.2	Determine the maxima and minima of multivariable functions
MAT101.3	Determine areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas using multiple integrals
MAT101.4	Determine whether a given series is convergent, absolutely convergent or conditionally convergent
MAT101.5	Determine the Taylor and Fourier series expansion.

COURSE: PHT100 ENGINEERING PHYSICS A	
PHT100.1	Compute the quantitative aspects of waves and oscillations in engineering systems
PHT100.2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments
PHT100.3	Examine the behavior of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices
PHT100.4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems
PHT100.5	Examine the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system

COURSE: EST100 ENGINEERING MECHANICS	
EST100.1	Explain principles and theorems related to rigid body mechanics
EST100.2	Describe the components of system of forces acting on the rigid body
EST100.3	Apply the conditions of equilibrium to various practical problems involving different force system.
EST100.4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
EST100.5	Brief about dynamics and mechanical vibrations, solve simple numerical related to it




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COURSE: EST 120BASICS OF CIVIL ANDMECHANICAL ENGINEERING	
EST 120.1	Recall the role of civil engineer in society to relate the variousdisciplines of Civil Engineering and types of buildings, area and its functions, rules and regulations.
EST 120.2	Describe the importance, objectives and principles ofsurveying and to explain different types of building materialsused for construction
EST 120.3	Describe about the building construction, and summarizeabout the basic infrastructure services and green buildings.
EST 120.4	Analyse thermodynamic cycles and to explain the features andworking of IC engines.
EST 120.5	Explain the basic principles of refrigeration & air conditioningand the working of various hydraulic machines.
EST 120.6	Explain the basic manufacturing, metal joining and machiningprocesses.

COURSE: HUN 101 LIFE SKILLS	
HUN101.1	Define and Identify different life skills required in personal and professional life.
HUN101.2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress
HUN101.3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
HUN101.4	Take part in group discussions.
HUN101.5	Use appropriate thinking and problem solving techniques to solve new problems.
HUN101.6	Understand the basics of teamwork and leadership

COURSE: ESL 120 CIVIL AND MECHANICAL WORKSHOP	
ESL 120.1	Name and explain the use of various tools and devices for various civil engineering field measurements
ESL 120.2	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work
ESL 120.3	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
ESL 120.4	Identify Basic Mechanical workshop operations in accordance with the material and objects
ESL 120.5	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades.
ESL 120.6	Apply appropriate safety measures with respect to the mechanical workshop trades.



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COURSE: PHL 120ENGINEERING PHYSICS LAB	
PHL120.1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
PHL120.2	Understand the need for precise measurement practices for data recording
PHL120.3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
PHL120.4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics

SEMESTER II

COURSE: MAT102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS	
MAT102.1	Apply the concept of vector functions and learn to work with conservative vector field
MAT102.2	Apply computing integrals of scalar and vector field over surfaces in three-dimensional space.
MAT102.3	Solve homogeneous and non-homogeneous linear differential equation with constant
MAT102.4	Apply Laplace transforms to solve physical problems arising in engineering
MAT102.5	Apply Fourier transforms to solve physical problems arising in engineering

COURSE: CYT 100 ENGINEERING CHEMISTRY	
CYT 100.1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
CYT 100.2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
CYT 100.3	Understand the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterization of nanomaterials.
CYT 100.4	Understand the knowledge of stereochemistry, conducting polymers and advanced polymers in engineering.
CYT 100.5	Apply the knowledge of different types of water treatment methods to develop skills for treating wastewater

COURSE: EST 110ENGINEERING GRAPHICS	
EST 110.1	To able to draw the projection of points and lines located in different quadrants
EST 110.2	To able prepare multi view orthographic projections of objects by visualizing them in different positions
EST 110.3	To able to draw sectional views and develop surfaces of a given object
EST 110.4	To prepare pictorial drawings using the principles of isometric.



HUN102.5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
HUN102.6	Create professional and technical documents that are clear and adhering to all the necessary conventions

ESL130 BASICS OF ELECTRICAL AND ELECTRONICS WORKSHOP

ESL130.1	Explain various positional number systems and binary codes
ESL130.2	Relate basic postulates of Boolean algebra and show the correlation between Boolean expression
ESL130.3	Discuss various logic families and their characteristics.
ESL130.4	Identify and test basic electronic components used in simple electronic circuits.
ESL130.5	Draw circuit schematics with EDA tools to fabricate single sided PCB.
ESL130.6	Assemble circuits on general purpose PCB.
ESL130.7	Work in a team and produce good technical documentation of experiments.

COURSE: CYL120 ENGINEERING CHEMISTRY LAB

CYL120.1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses.
CYL120.2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs.
CYL120.3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds.
CYL120.4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis

SEMESTER III

COURSE: ECT201 SOLID STATE DEVICES

ECT201.1	Apply FermiDirac Distribution function and Compute carrier concentration at equilibrium and the parameters associated with generation, recombination and transport mechanism
ECT201.2	Explain drift and diffusion currents in extrinsic semiconductors and Compute current density due to these effects.
ECT201.3	Define the current components and derive the current equation in a pn junction diode and bipolar junction transistor.
ECT201.4	Explain the basic MOS physics and derive the expressions for drain current in linear and saturation regions.
ECT201.5	Discuss scaling of MOSFETs and short channel effects.



COURSE: EC MAT 201	
MAT 201.1	Solve the partial differential equation.
MAT 201.2	Analyse and solve one dimensional wave equation and heat equation.
MAT 201.3	Determine the continuity and differentiability of complex functions using Cauchy Riemann equations
MAT 201.4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula
MAT 201.5	Apply residue theorem to compute several kinds of real integrals of complex function.

COURSE: ECT 203 LOGIC CIRCUIT DESIGN	
ECT203.1	Work with a positional number systems and numeric representations
ECT203.2	Introduce basic postulates of Boolean algebra and show the correlation between Boolean expression
ECT203.3	Analyse and design various combinational circuits
ECT203.4	Design and implement various synchronous sequential circuits
ECT203.5	Understand various logic families and their characteristics

COURSE: ECT205 NETWORK THEORY	
ECT205.1	Apply basic Kirchhoff's law in mesh and node analysis to solve linear AC/DC network circuit.
ECT205.2	Apply network theorems to solve linear AC/DC network circuit.
ECT205.3	Apply Laplace transforms to carry out transient analysis, with and without initial conditions, in RLC circuits.
ECT205.4	Apply network functions to analyze single port and two port network.
ECT205.5	Represent any twoport network by Impedance, Admittance, Transmission and Hybrid network parameters.
ECT205.6	Apply basic Kirchhoff's law in mesh and node analysis to solve linear AC/DC network circuit.

COURSE: HUT200 PROFESSIONAL ETHICS	
HUT200.1	Understand the core values that shape the ethical behaviour of a professional
HUT200.2	Adopt a good character and follow an ethical life
HUT200.3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics
HUT200.4	Solve moral and ethical problems through exploration and assessment by established experiments
HUT200.5	Understand the various ethical areas and how engineers can be good leaders

COURSE: MCN201 SUSTAINABLE ENGINEERING	
MCN201.1	Understand the relevance and the concept of sustainability and the global initiatives
MCN201.2	Identify the different types of environmental pollution problems and their sustainable solutions
MCN201.3	Discuss the environmental regulations and standards
MCN201.4	Outline the concepts related to conventional and nonconventional energy
MCN201.5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles

COURSE: ECL 201 SCIENTIFIC COMPUTING LAB	
ECL201.1	Familiarize one programming language for scientific computing.
ECL201.2	Implement Array and Matrix operations using one programming language.
ECL201.3	Solve numerical integration, differentiation and ordinary differential equations for engineering applications.
ECL201.4	Realize how periodic functions are constituted by sinusoids.
ECL201.5	Simulate random processes and understand their statistics.




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SEMESTER IV

COURSE: MAT 204 PROBABILITY, RANDOM PROCESS AND NUMERICAL METHODS

MAT204.1	Apply the Concept of random variables using Discrete probability distributions with practical applications in engineering and social life situations
MAT204.2	Apply the concepts of random variables using Continuous probability distributions with practical applications in engineering and social life situations
MAT204.3	Apply the concepts of random variables using joint probability distributions with practical applications in engineering and social life situations
MAT204.4	Apply the concepts of autocorrelation and power spectral density for analyzing random signals
MAT204.5	Analyzing and quantifying random phenomena using various models of random process.

COURSE: ECT 202 ANALOG CIRCUITS

ECT 202.1	Design R C circuits and BJT biasing circuits
ECT 202.2	Analyse small signal and high frequency equivalent circuits of BJT configuration using hybrid pi model.
ECT 202.3	Analyse small signal equivalent circuits of MOSFET circuits using hybrid pi model
ECT 202.4	Analyse and design various feedback amplifiers, oscillators and tuned amplifiers
ECT 202.5	Analyse and design power amplifiers and transistor based voltage regulators

COURSE: ECT 204 SIGNALS AND SYSTEMS

EC204.1	Apply the properties of signals and systems to classify them and describe orthogonality of signals and convolution integral.
EC 204.2	Represent signals with the help of Fourier series, Fourier transform and Laplace transform.
EC204.3	Apply transfer function to compute the LTI response to input signals.
EC204.4	Use the Nyquist sampling theorem for bandpass signal and calculate the sampling rate for aliasing free sampling of a signal.
EC204.5	Analyze Discrete LTI systems using Discrete Time Fourier Series (DTFS) and Discrete Time Fourier transforms (DTFT).
EC204.6	Analyze Discrete LTI systems using Z transforms and use simulation software for signals and systems.

COURSE: ECT 206 COMPUTER ARCHITECTURE AND MICROCONTROLLERS	
EC206.1	Explain the functional units, I/O and memory management w.r.t. a typical computer architecture.
EC206.2	Explain 8051 architecture with addressing modes and instruction set.
EC206.3	Develop simple programs using assembly language programming embedded C.
EC206.4	Explain system software and Advanced RISC Machine Architecture.
EC206.5	Illustrate various memory systems and input/output organization.
EC206.6	Explain the functional units, I/O and memory management w.r.t. a typical computer architecture.

COURSE: MCN202 CONSTITUTION OF INDIA	
MCN202.1	Understand the background of the present constitution of India and features.
MCN202.2	Utilize the fundamental rights and duties.
MCN202.3	Understand the working of the union executive, parliament and judiciary.
MCN202.4	Utilize the special provisions and statutory institutions.
MCN202.5	Show national and patriotic spirit as responsible citizens of the country

COURSE:ECL 202 ANALOG CIRCUITS AND SIMULATION LAB	
ECL 202.1	Design and demonstrate the functioning of basic analog circuits using discrete components.
ECL 202 .2	Design and simulate the functioning of basic analog circuits using simulation tools.
ECL 202 .3	Function effectively as an individual and in a team to accomplish the given task.

COURSE:ECL 204 MICROCONTROLLER LAB	
ECL 204.1	Write an Assembly language program/Embedded C program for performing data manipulation
ECL 204.2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals.
ECL 204.3	Perform programming/interfacing experiments with IDE for modern microcontrollers.



COURSE: EST200 DESIGN & ENGINEERING	
EST200.1	Explain the different concepts and principles involved in design engineering.
EST200.2	Apply design thinking while learning and practicing engineering.
EST200.3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering

SEMESTER V	
COURSE: ECT 301 LINEAR INTEGRATED CIRCUITS	
ECT 301.1	Understand Op Amp fundamentals and differential amplifier configuration
ECT 301.2	Familiarize the various types of feedbacks used in opamp circuits and Design operational amplifier circuits for various applications
ECT 301.3	Analyze and design of various waveform generators and filters
ECT 301.4	Explain the working and application of timer, VCO, and PLL ICs
ECT 301.5	Outline the working of voltage regulator IC's and Data converters

COURSE: ECT 303 DIGITAL SIGNAL PROCESSING	
ECT 303.1	State and prove the fundamental properties and relations relevant to DFT and solve basic problems involving DFT based filtering methods.
ECT 303.2	Compute DFT and IDFT using DIT and DIF radix2 FFT algorithms.
ECT 303.3	Design linear phase FIR filters and IIR filters for a given specification.
ECT 303.4	Illustrate the various FIR and IIR filter structures for the realization of the given system function and the basic multirate DSP operations.
ECT 303.5	Explain the architecture of DSP processor (TMS320C67xx) and the finite word length effects.

COURSE: ECT 305 ANALOG AND DIGITAL COMMUNICATION	
ECT 305.1	Apply the basic concepts for implementation of transmitter and receiver systems used in AM and FM.
ECT 305.2	Apply the basic concepts of information theory to analyze the various source coding techniques.
ECT 305.3	Identify the main components in a digital communication system and also apply the knowledge of pulse modulation technique for the transmission of data.
ECT 305.4	Understand the effects of Inter Symbol Interference during the transmission of binary data
ECT 305.5	Compare the digital modulation schemes and their detection in the presence of noise.

COURSE: ECT 307 CONTROL SYSTEMS

ECT 307.1	Analyse electromechanical systems by mathematical modelling and derive their transfer functions
ECT 307.2	Determine Transient and Steady State behaviour of systems using standard test signals
ECT 307.3	Determine absolute stability and relative stability of a system
ECT 307.4	Apply frequency domain techniques to assess the system performance and to design a control system with suitable compensation techniques
ECT 307.5	Analyse system Controllability and Observability using state space representation

COURSE: HUT 300 INDUSTRIAL ECONOMICS AND FOREIGN TRADE

HUT 300.1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare.
HUT 300.2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production.
HUT 300.3	Determine the functional requirement of a firm under various competitive conditions.
HUT 300.4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.
HUT 300.5	Determine the impact of changes in global economic policies on the business opportunities of a firm.

COURSE:MCN301 DISASTER MANAGEMENT

MCN301.1	Define and use various terminology in use in disaster management parlance and organize each of these term in relation to the disaster management cycle knowledge level.
MCN301.2	Distinguish between different hazards type and vulnerability type and do vulnerability assessment
MCN301.3	Identify the components and describe the process of risk assessment and apply appropriate methodologies to assess risk and response for it
MCN301.4	Discuss about stakeholder's role,communications and capacity related issues.
MCN301.5	Explain various legislations and best practices for disaster management and risk reduction at national and international level

COURSE: ECL 331 ANALOG INTEGRATED CIRCUITS AND SIMULATION LAB

ECL 331 .1	Use data sheets of basic Analog Integrated Circuits and design and implement application circuits using Analog ICs.
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ECL 331 .2	Design and simulate the application circuits with Analog Integrated Circuits using simulation tools.
ECL 331 .3	Function effectively as an individual and in a team to accomplish the given task.

COURSE: ECL 333 DIGITAL SIGNAL PROCESSING LAB

ECL 333 .1	Simulate digital signals Python/Scilab/MATLAB.
ECL 333 .2	verify the properties of DFT computationally
ECL 333 .3	Familiarize the DSP hardware and interface with computer.
ECL 333 .4	Implement LTI systems with linear convolution, block convolution and FFT.
ECL 333 .5	Implement FFT and IFFT and use it on real time signals.
ECL 333 .6	Implement FIR low pass filter.

SEMESTER VI

COURSE: ECT 302 ELECTROMAGNETICS

ECT 302.1	Summarize the basic mathematical concepts related to electromagnetic vector fields.
ECT 302.2	Analyse Maxwell's equation in different forms and apply them to diverse engineering problems
ECT 302.3	Analyse electromagnetic wave propagation and wave polarization
ECT 302.4	Analyse the characteristics of transmission lines and solve the transmission line problems using Smith chart.
ECT 302.5	Analyse and evaluate the propagation of EM waves in Wave guides.

COURSE: ECT 304 VLSI CIRCUIT DESIGN

ECT 304.1	Explain the various methodologies in ASIC and FPGA design
ECT 304.2	Design VLSI Logic circuits with various MOSFET logic families.
ECT 304.3	Compare different types of memory elements.
ECT 304.4	Design various Adders and multipliers.
ECT 304.5	Explain MOSFET fabrication techniques and layout design rules.

COURSE:ECT 306 INFORMATION THEORY AND CODING

ECT 306.1	Apply the basics concepts of information theory to analyze the various source coding techniques
ECT 306.2	Analyze various coding schemes,different types of channel and their capacity
ECT 306.3	Apply the basics knowledge of error detection and error correction using linear block codes .
ECT 306.4	Apply the basics knowledge of error detection and error correction using cyclic codes.
ECT 306.5	Apply the basics knowledge of error detection and error correction using convolution codes.

COURSE: ECT 362 Introduction to MEMS

ECT 362.1	Describe the working principles of micro sensors and actuators
ECT 362.2	Identify commonly used mechanical structures in MEMS
ECT 362.3	Explain the application of scaling laws in the design of micro systems
ECT 362.4	Identify the typical materials used for fabrication of micro systems
ECT 362.5	Explain the principles of standard micro fabrication techniques
ECT 362.6	Explain the challenges in the design and fabrication of Micro systems

COURSE:HUT310MANAGEMENT FOR ENGINEERS

HUT310.1	Explain the characteristics of management in the contemporary context
HUT310.2	Describe the functions of management
HUT310.3	Demonstrate ability in decision making process and productivity analysis
HUT310.4	Illustrate project management technique and develop a project schedule
HUT310.5	Summarize the functional areas of management
HUT310.6	Comprehend the concept of entrepreneurship and create business plans

COURSE: ECT 308 COMPREHENSIVE COURSE WORK

ECT 308.1	Apply the knowledge of circuit theorems and solid state physics to solve the problems in electronic Circuits
ECT 308.2	Design a logic circuit for a specific application



ECT 308.3	Design linear IC circuits for linear and nonlinear circuit applications. Explain basic signal processing operations and Filter designs Explain existent analog and digital communication systems.
ECT 308.4	
ECT 308.5	

COURSE: ECL 332 COMMUNICATION LAB

ECL 332.1	Setup prototype circuits for waveform coding and digital modulation techniques.
ECL 332.2	Simulate the error performance of a digital communication system using standard modulation schemes.
ECL 332.3	Emulate a communication system with software designed radio hardware and necessary control software.

COURSE: ECD 334 MINIPROJECT

ECD 334.1	Be able to practice acquired knowledge within the selected area of technology for project development.
ECD 334.2	Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach.
ECD 334.3	Reproduce, improve and refine technical aspects for engineering projects.
ECD 334.4	Work as a team in development of technical projects.
ECD 334.5	Communicate and report effectively project related activities and findings.

SEMESTER VII

COURSE: ECT 401 MICROWAVES AND ANTENNAS

ECT 401.1	Understand the basic concept of antennas and its parameters
ECT 401.2	Analyse the far field pattern of Short dipole and half wave dipole antenna
ECT 401.3	Design of various broad band antennas
ECT 401.4	Illustrate the principle of operation of cavity resonators and various microwave sources.
ECT 401.5	Explain various microwave hybrid circuits and microwave semiconductor devices.

COURSE: ECT 413 Optical Fiber Communication

ECT 413.1	Understand the working and classification of optical fibres in terms of propagation modes.
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ECT 413.2	Understand various transmission characteristics and losses in optical fibres.
ECT 413.3	Understand the constructional features and the characteristics of optical sources.
ECT 413.4	Understand the working principle of various optical amplifiers and their performance comparison
ECT 413.5	Understand the concept of WDM, FSO and LiFi

COURSE: EET435 RENEWABLE ENERGY SYSTEMS

EET435.1	Choose the appropriate energy source depending on the available resources.
EET435.2	Explain the concepts of solar thermal and solar electric systems.
EET435.3	Illustrate the operating principles of wind, and ocean energy conversion systems.
EET435.4	Outline the features of biomass and small hydro energy resources
EET435.5	Describe the concepts of fuel cell and hydrogen energy technologies

COURSE: ECL 411 ELECTROMAGNETICS LAB

ECL 411.1	Analyse the basic Microwave components, microwave measurements and its parameters.
ECL 411.2	Understand the principles of fiberoptic communications and the different kind of losses, signal distortion and other signal degradation factors.
ECL 411.3	Simulate basic antenna experiments with simulation tools.

COURSE: MCN401 INDUSTRIAL SAFETY ENGINEERING

MCN401.1	Describe the theories of accident causation and preventive measures of industrial accidents
MCN 401 .2	Explain about personal protective equipment, its selection, safety performance and indicators and importance of house keeping
MCN 401 .3	Explain different issues in construction industries
MCN 401 .4	Describe the various hazards associated with different machines and mechanical material handling
MCN 401 .5	Utilize different hazard identification tools in different industries in the knowledge of different types of chemical hazards.

COURSE: ECQ 413 SEMINAR

ECQ413.1	Identify academic documents from the literature which are related to her/his areas of interest.
ECQ413.2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest.

ECQ413.3	Developing the content for presentation about an academic document
ECQ413.4	Presenting the academic document.
ECQ413.5	Developing a technical report related to content.

COURSE: ECD 415 PROJECT PHASE I

ECD415.1	Model and solve real world problems by applying knowledge across domains.
ECD415.2	Develop products, processes or technologies for sustainable and socially relevant applications.
ECD415.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks.
ECD415.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.
ECD415.5	Identify technology/research gaps and propose innovative/creative solutions.
ECD415.6	Organize and communicate technical and scientific findings effectively in written and oral forms.

SEMESTER VIII

COURSE: ECT 402 WIRELESS COMMUNICATION

ECT 402.1	Understand the basics of cellular system and cellular design fundamentals.
ECT 402.2	Discuss various wireless channel models and capacity of wireless channels
ECT 402.3	Analysis of modulation techniques for flatfading channels and frequency selective channels
ECT 402.4	Illustrate various diversity techniques, equalization and discuss various multiple access techniques
ECT 402.5	Calculate system parameters in different modes of radio wave propagation.

COURSE: ECT414 BIOMEDICAL ENGINEERING

ECT414.1	Understand various anatomical and physiological functions of the human body and about the biopotentials produced in it.
ECT414.2	Understand about various biopotential electrodes and measurement of potential in ECG.
ECT414.3	Illustrate various techniques used for measurement of Blood flow, blood pressure and heart
ECT414.4	Understand the concept of recording of EEG, EMG and ERG signals and therapeutic devices.
ECT414.5	Describe the advances in medical imaging techniques, and understand the concepts of biotelemetry and patient safety.


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COURSE: ECT416 MODERN COMMUNICATION SYSTEMS

ECT416.1	Explain OFDM, OFDMA AND SCFDMA techniques used in cellular communication
ECT416.2	Discuss the different wireless communication standards for short range communication
ECT416.3	Explain the IOT architecture and various connectivity technologies used in IOT systems
ECT416.4	Understand the various communication standards for connected autonomous vehicles
ECT416.5	Explain the significance and architecture of software defined radio and cognitive radio

COURSE: ECT 448 LOW POWER VLSI

ECT 448.1	Identify various short channel effects and various sources of power dissipation in MOSFET
ECT 448.2	Apply various power reduction techniques to circuits
ECT 448.3	Apply various clocked styles for logic implementation.
ECT 448.4	Apply various non clocked design styles for logic implementation
ECT 448.5	Apply Adiabatic and reversible logic for circuit implementation.

COURSE: ECT 404 COMPREHENSIVE VIVA VOCE

ECT 404.1	Improve their understanding of different subjects learnt in previous semesters
ECT 404.2	Recall and Refresh fundamental concepts which they learn in different subjects.
ECT 404.3	Enhance their interview facing skills

COURSE: ECD 416 PROJECT PHASE II

ECD 416.1	Model and solve real world problems by applying knowledge across domains.
ECD 416.2	Develop products, processes or technologies for sustainable and socially relevant applications.
ECD 416.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks.
ECD 416.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms.
ECD 416.5	Identify technology/research gaps and propose innovative/creative solutions.
ECD 416.6	Organize and communicate technical and scientific findings effectively in written and oral forms.

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MANGALAM COLLEGE OF ENGINEERING
DEPARTMENT OF CHEMICAL ENGINEERING
COURSE OUTCOMES OF 2019 CURRICULAM

SEMESTER I	
COURSE - MAT 101 LINEAR ALGEBRA AND CALCULUS	
MAT 101.1	Solve systems of linear equations, diagonalize matrices and characterise quadratic forms
MAT 101.2	Compute the partial and total derivatives and maxima and minima of multivariable functions
MAT 101.3	Compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminae
MAT 101.4	Perform various tests to determine whether a given series is convergent, absolutely convergent or conditionally convergent
MAT 101.5	Determine the Taylor and Fourier series expansion of functions and learn their applications

COURSE - CYT 100 ENGINEERING CHEMISTRY	
CYT 100.1	Apply the basic concepts of electrochemistry and corrosion to explore possible applications in various engineering fields.
CYT 100.2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
CYT 100.3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.
CYT 100.4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
CYT 100.5	Study various types of water treatment methods to develop skills for treating wastewater.

COURSE : EST 110 ENGINEERING GRAPHICS	
EST 110.1	Draw the projection of points and lines located in different quadrants
EST 110.2	Prepare multiview orthographic projections of objects by visualizing them in different positions
EST 110.3	Draw sectional views and develop surfaces of a given object
EST 110.4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions
EST 110.5	Convert 3D views to orthographic views
EST 110.6	Obtain multiview projections and solid models of objects using CAD tools

COURSE : EST 130 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	
EST 130.1	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
EST 130.2	Develop and solve models of magnetic circuits
EST 130.3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state
EST 130.4	Describe working of a voltage amplifier
EST 130.5	Outline the principle of an electronic instrumentation system
EST 130.6	Explain the principle of radio and cellular communication



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COURSE : HUN 101 LIFE SKILLS	
HUN 101.1	Define and Identify different life skills required in personal and professional life
HUN 101.2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
HUN 101.3	Explain the basic mechanics of effective communication and demonstrate these through presentations
HUN 101.4	Take part in group discussions
HUN 101.5	Use appropriate thinking and problem solving techniques to solve new problems
HUN 101.6	Understand the basics of teamwork and leadership

COURSE : CYL 120 ENGINEERING CHEMISTRY LAB	
CYL 120.1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds
CYL 120.2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
CYL 120.3	Develop the ability to understand and explain the use of modern spectroscopic
CYL 120.4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
CYL 120.5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
CYL 120.6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum

COURSE : ESL 130 ELECTRICAL & ELECTRONICS WORKSHOP	
ESL 130	Demonstrate safety measures against electric shocks.
ESL 130	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols
ESL 130	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
ESL 130	Identify and test various electronic components
ESL 130	Draw circuit schematics with EDA tools
ESL 130	Assemble and test electronic circuits on boards
ESL 130	Work in a team with good interpersonal skills



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SEMESTER 2**COURSE: MAT102 VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS**

MAT102.1	Compute the derivatives and line integrals of vector functions and learn their applications
MAT102.2	Evaluate surface and volume integrals and learn their inter-relations and applications.
MAT102.3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
MAT102.4	Compute Laplace transform and apply them to solve ODEs arising in engineering
MAT102.5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering

COURSE: PHT 110 ENGINEERING PHYSICS B

PHT 110.1	Compute the quantitative aspects of waves and oscillations in engineering systems
PHT 110.2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
PHT 110.3	Analyze the behavior of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices
PHT 110.4	Apply the knowledge of ultrasonics in non-destructive testing and use the principles of acoustics to explain the nature and characterization of a acoustic design and to provide a safe and healthy environment
PHT 110.5	Apply the comprehended knowledge about laser and fiber optic communication systems in various engineering applications

COURSE: EST100 ENGINEERING MECHANICS

EST100.1	Recall principles and theorems related to rigid body mechanics
EST100.2	Identify and describe the components of system of forces acting on the rigid body
EST100.3	Apply the conditions of equilibrium to various practical problems involving different force system.
EST100.4	Choose appropriate theorems, principles or formulae to solve problems of mechanics.
EST100.5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses

COURSE: EST 120 BASICS OF CIVIL & MECHANICAL ENGINEERING

EST 120.1	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
EST 120.2	Explain different types of buildings, building components, building materials and building construction
EST 120.3	Describe the importance, objectives and principles of surveying.
EST 120.4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
EST 120.5	Discuss the Materials, energy systems, water management and environment for green buildings.
EST 120.6	Analyse thermodynamic cycles and calculate its efficiency
EST 120.7	Illustrate the working and features of IC Engines
EST 120.8	Explain the basic principles of Refrigeration and Air Conditioning
EST 120.9	Describe the working of hydraulic machines
EST 120.10	Explain the working of power transmission elements



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EST 120 11	Describe the basic manufacturing, metal joining and machining processes
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COURSE: HUN 102 PROFESSIONAL COMMUNICATION	
HUN 102.1	Develop vocabulary and language skills relevant to engineering as a profession
HUN 102.2	Analyze, interpret and effectively summarize a variety of textual content
HUN 102.3	Create effective technical presentations
HUN 102.4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
HUN 102.5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
HUN 102.6	Create professional and technical documents that are clear and adhering to all the necessary conventions

COURSE: EST 102 PROGRAMING IN C	
EST 102.1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
EST 102.2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
EST 102.3	Write readable C programs with arrays, structure or union for storing the data to be processed
EST 102.4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
EST 102.5	Write readable C programs which use pointers for array processing and parameter passing
EST 102.6	Develop readable C programs with files for reading input and storing output

COURSE: PHL 120 ENGINEERING PHYSICS LAB	
PHL 120.1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
PHL 120.2	Understand the need for precise measurement practices for data recording
PHL 120.3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
PHL 120.4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics
PHL 120.5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

COURSE: ESL 120 CIVIL & MECHANICAL WORKSHOP	
ESL 120	Name different devices and tools used for civil engineering measurements


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COURSE: MAT201 PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS	
MAT 201.1	Understand the concept and the solution of partial differential equation
MAT 201.2	Analyse and solve one dimensional wave equation and heat equation
MAT 201.3	Understand complex functions, its continuity differentiability with the use of Cauchy-Riemann equations.
MAT 201.4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function
MAT 201.5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals

COURSE: HUT200 PROFESSIONAL ETHICS	
HUT 200.1	Understand the core values that shape the ethical behaviour of a professional
HUT 200.2	Adopt a good character and follow an ethical life
HUT 200.3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
HUT 200.4	Solve moral and ethical problems through exploration and assessment by established experiments
HUT 200.5	Apply the knowledge of human values and social values to contemporary ethical values and global issues

COURSE: CHL201 CHEMICAL TECHNOLOGY AND ENVIRONMENTAL ENGINEERING LAB	
CHL 201.1	Analyse and estimate parameters for the selected chemicals
CHL 201.2	Develop skills to use analytical and instrumental methods for measurement of parameters relevant to chemical engineering.
CHL 201.3	Develop skills of accuracy in experimentation, interpret the experimental result and suggest its area of application.
CHL 201.4	Demonstrate capacity to work in team and exhibit knowledge of safety, health and environment by practicing laboratory ethics

COURSE: CHT203 CHEMISTRY LAB FOR PROCESS ENGINEERING	
CHL 203.1	Explain the thermodynamics of solutes in a solvent and apply this knowledge in higher semester practical sessions
CHL 203.2	Describe the mutual solubilities of liquids and apply this idea in solvent extraction
CHL 203.3	Construct a phase diagram of bi and tri component systems and predict the composition of mixtures at various temperature.
CHL 203.4	Evaluate the capacity of coagulating electrolytes and synthesize colloidal solutions and
CHL 203.5	Investigate adsorption isotherms and apply this knowledge in various industrial processes
CHL 203.6	Quantify the analyte using electrochemical analytical techniques such as conductometry and potentiometry

COURSE: MCN201 SUSTAINBLE ENGINEERING	
MCN 201.1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
MCN 201.2	Explain the different types of environmental pollution problems and their sustainable solutions
MCN 201.3	Discuss the environmental regulations and standards
MCN 201.4	Outline the concepts related to conventional and non-conventional energy
MCN 201.5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles



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ESL120	Explain the use of various tools and devices for various field measurements
ESL120	Demonstrate the steps involved in basic civil engineering activities like plot measurement, setting out operation, evaluating the natural profile of land, plumbing and undertaking simple construction work
ESL120	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing
ESL120	Compare different techniques and devices used in civil engineering measurements
ESL120	Identify Basic Mechanical workshop operations in accordance with the material and objects
ESL120	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
ESL120	Apply appropriate safety measures with respect to the mechanical workshop trades

SEMESTER 3

COURSE: CHT201 CHEMISTRY FOR PROCESS ENGINEERING	
CHT201.1	Describe the principles, instrumentation and applications of advanced electrochemical analytical tools
CHT202.2	Explain the working principles, instrumentation and applications of atomic and molecular spectroscopic techniques and Electron microscopy.
CHT203.3	Illustrate distribution law and apply the knowledge in solvent extraction and describe the kinetics of different chemical processes.
CHT204.4	Interpret different adsorption isotherms and familiarize colloids, emulsion and surfactants.
CHT205.5	Explain the basic concepts of nuclear chemistry and photochemical process and solve decay kinetic problems

COURSE: CHT203 CHEMICAL PROCESS PRINCIPLES	
CHT 203.1	Distinguish and summarize various unit operations & unit processes.
CHT 203.2	Translate physical quantities and empirical equations from one set of units to another quickly and accurately.
CHT 203.3	Estimate chemical composition and other physical quantities such as density, flow rate, pressure and temperature.
CHT 203.4	Apply ideal and real gas equations of state to establish fundamental properties of fluids.
CHT 203.5	Define various terminologies related to humidification and utilize the humidity chart to determine the properties of air-water vapor system.
CHT 203.6	Develop and solve basic material & energy balance equations for the unit operations and unit processes employed in process industries.

COURSE: CHT205 FLUID AND PARTICLE MECHANICS	
CHT 205.1	Apply the basic properties and transport laws to fluid in different conditions like statics and dynamics
CHT 205.2	Apply the fluid flow principles in the application of the mass, momentum and energy equations
CHT 205.3	Design a piping network using the concept of fluid dynamics
CHT 205.4	Design a fluidized bed and a packed bed using the concept of fluid dynamics considering its application
CHT 205.5	Select valves, pumps and flow measuring devices in process industries with the


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SEMESTER 4	
COURSE: CHT202 CHEMICAL ENGINEERING THERMODYNAMICS	
CHT 202.1	Apply the laws of thermodynamics to analyse various processes
CHT 202.2	Define thermodynamic properties and processes of a system
CHT 202.3	Relate various thermodynamic properties to easily measurable properties
CHT 202.4	Calculate the change in properties when given substances are mixed under specified conditions
CHT 202.5	Construct phase diagrams and Explain VLE of completely miscible, partially miscible and immiscible liquids
CHT 202.6	Evaluate equilibrium constant, composition and degrees of freedom for reactions taking place in a given mixture of components at given conditions of temperature and pressure

COURSE: CHT204 HEAT TRANSFER OPERATIONS	
CHT 204.1	Identify and distinguish various modes of heat transfer and examine the mechanisms involved
CHT 204.2	Apply appropriate governing equations and analyse conduction heat transfer problems for different geometries under steady state and transient processes
CHT 204.3	Solve forced and natural convection heat transfer problems using empirical equations
CHT 204.4	Explain the concepts behind radiation heat transfer and solve radiation heat transfer problems
CHT 204.5	Analyse the heat transfer processes involved in boiling and condensation
CHT 204.6	Design of heat exchangers and evaporators after interpreting the basic concepts

COURSE: CHT206 PARTICLE TECHNOLOGY	
CHT 206.1	Evaluate the particle size distribution, mean particle diameter, specific surface area and number of particles per unit mass using techniques such as sieve analysis, pipette analysis and beaker decantation
CHT 206.2	Identify the principles of free settling, hindered settling and mineral beneficiation techniques
CHT 206.3	Apply the concepts of filtration theory and select appropriate filtration equipment
CHT 206.4	Describe separation techniques for particulates in air
CHT 206.5	Select suitable size reduction equipment and estimate the energy requirements for a specified reduction in size for a given material
CHT 206.6	Demonstrate mixing and conveying processes in chemical industries

COURSE: MCN202 CONSTITUTION OF INDIA	
MCN 202.1	Explain the background of the present constitution of India and features.
MCN 202.2	Utilize the fundamental rights and duties.
MCN 202.3	Understand the working of the union executive, parliament and judiciary.
MCN 202.4	Understand the working of the state executive, legislature and judiciary.
MCN 202.5	Utilize the special provisions and statutory institutions.
MCN 202.6	Show national and patriotic spirit as responsible citizens of the country.

COURSE: MAT202 PROBABILITY, STATISTICS AND NUMERICAL METHODS	
MAT 202.1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.
MAT 202.2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena.
MAT 202.3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population.
MAT 202.4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques.
MAT 202.5	Apply standard numerical techniques for solving systems of equations, fitting curves.



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on given numerical data and solving ordinary differential equations

COURSE: CHL 202 FLUID AND PARTICLE MECHANICS LAB

CHL 202.1	Plan and perform experiments in flow measuring equipments and analyse the principles involved
CHL 202.2	Plan and perform experiments in fluid moving machinery and analyse the principles involved
CHL 202.3	Plan and perform experiments in solid-fluid systems and analyse the principles involved.
CHL 202.4	Demonstrate capacity to work in teams and exhibit knowledge of safety, health and environment by practicing laboratory ethics.

COURSE: CHL202 PARTICLE TECHNOLOGY LAB

CHL 204.1	Use the basic principles of Particle technology to find solutions of problems by conducting experiments in the laboratory.
CHL 204.2	Design experiments and investigation in the laboratory analyze/interpret data collected from experimental
CHL 204.3	Use modern computing tools necessary for analysis of the experimental data in the laboratory
CHL 204.4	Exhibit ethical principles in engineering profession by practicing ethical approaches in experimental investigation, collection and reporting of data and adhering to the safety ethics set by the laboratory
CHL 204.5	Practice work in diverse groups and perform laboratory experiments
CHL 204.6	Prepare cogent reports of the experimental works conducted in laboratory

SEMESTER 5

COURSE: CHT301 MASS TRANSFER OPERATIONS - I


CHT 301.1	Analyse fundamentals of mass transfer operations and estimate diffusion coefficients
CHT 301.2	Summarize interface mass transfer and concepts of mass transfer coefficients
CHT 301.3	Differentiate among different types of equipment's for mass transfer operations
CHT 301.4	Analyze and design tray and packed columns of gas liquid contacting equipment's
CHT 301.5	Analyze and design humidification and adsorption systems
CHT 301.6	Analyze and design drying and crystallization systems.

COURSE: CHT303 ENVIRONMENTAL ENGINEERING

CHT 303.1	Explain the environmental legislation and regulation aimed at protecting the environment from harmful actions.
CHT 303.2	Explain the different types of treatment processes for drinking water, municipal water, boiler feed water and saline water.
CHT 303.3	Interpret primary, secondary and tertiary treatment methods used for wastewater treatment.
CHT 303.4	Compare aerobic and anaerobic wastewater treatment methods.
CHT 303.5	Select suitable methods for treatment and disposal of sludge, industrial and hazardous waste.
CHT 303.6	Identify the sources of air and noise pollution and select suitable control methods.

COURSE: CHT305 CHEMICAL REACTION ENGINEERING

CHT 305.1	Explain the principles of chemical kinetics and determine chemical kinetic parameters using batch reactor data.
CHT 305.2	Design of chemical reactors under ideal conditions.
CHT 305.3	Design of single and multiple reactions in ideal reactors.
CHT 305.4	Design chemical reactors for non-isothermal operations.
CHT 305.5	Design chemical reactors for non-ideal conditions.


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COURSE: HUT 300 INDUSTRIAL ECONOMICS AND FOREIGN TRADE	
HUT 300.1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare. (Cognitive knowledge level: Understand)
HUT 300.2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
HUT 300.3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)
HUT 300.4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society. (Cognitive knowledge level: Analyse)
HUT 300.5	Determine the impact of changes in global economic policies

COURSE: CHT 307 INSTRUMENTATION AND PROCESS CONTROL	
CHT 307.1	Categorize measuring instruments for industrial applications and illustrate instrumentation for temperature, pressure, flow, level, composition and pH.
CHT 307.2	Apply Laplace transforms to solve linear differential equations and to obtain the transfer function related to first order systems.
CHT 307.3	Develop the response of linear open loop second order systems and systems in series for various forcing functions.
CHT 307.4	Describe various types of controllers and analyse servo and regulatory problems of closed loop systems by using transient response.
CHT 307.5	Analyze the stability of linear systems by using analytical and graphical methods. Design controllers.

COURSE: MCN 301 DISASTER MANAGEMENT	
MCN 301.1	Define and use various terminologies in use in disaster management parlance and organise each of these terms in relation to the disaster management cycle (Cognitive knowledge level: Understand).
MCN 301.2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand).
MCN 301.3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand).
MCN 301.4	Explain the core elements and phases of Disaster Risk Management and develop possible measures to reduce disaster risks across sector and community (Cognitive knowledge level: Apply)
MCN 301.5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand).
MCN 301.6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand).

COURSE: CHL 333 PROCESS CONTROL LAB	
CHL 333.1	Sketch and use the calibration graphs of temperature and pressure measuring instruments
CHL 333.2	Test the dynamics of first order systems like temperature, level and mixing processes
CHL 333.3	Test the dynamics of second order systems such as thermometer with thermowell,

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	tanks in series and U-tube manometer
CHL 333.4	Test the characteristics of pneumatic control valves
CHL 333.5	Experiment on the control of temperature, flow and level processes
CHL 333.6	Experiment on controller tuning

COURSE: CHL 331 HEAT TRANSFER OPERATIONS LAB	
CHL 331.1	Experiment with various modes of heat transfer.
CHL 331.2	Evaluation the heat transfer coefficients.
CHL 331.3	Determine the rate of heat transfer in various modes of heat transfer.
CHL 331.4	Analyse the working of heat transfer equipments.
CHL 331.5	Interpret and present the experimental data meaningfully.
CHL 331.6	Develop teamwork skills.

SEMESTER 6	
COURSE: CHT302 MASS TRANSFER OPERATIONS - II	
CHT 302.1	Explain boiling point diagrams, relative volatility and differentiate various types of distillation techniques.
CHT 302.2	Design a fractionation column using McCabe – Thiele method and apply it for various reflux conditions.
CHT 302.3	Apply Ponchon - Savarit method to determine the number of stages required for a given separation in a fractionator for different reflux conditions and to understand rectification in packed columns.
CHT 302.4	Explain the theory of extraction and design of single stage and multi-stage extraction processes with an understanding of construction and working of extractors.
CHT 302.5	Explain the theory of leaching and design of single stage and multi-stage leaching processes with an understanding of construction and working of leaching equipments.
CHT 302.6	Differentiate among various types of membrane separation processes.

COURSE: CHT304 TRANSPORT PHENOMENA	
CHT 304.1	Explain the mechanisms of momentum, heat and mass transfer
CHT 304.2	Predict the transport coefficients of gases from basic physical variables
CHT 304.3	Solve industrial problems involving isothermal steady state momentum transfer in simple geometries using shell momentum balance, equations of change and boundary conditions
CHT 304.4	Obtain analytical solutions of selected simple engineering steady state problems of heat transfer using shell energy balance and equations of change
CHT 304.5	Analyze simple steady state diffusion problems using shell mass balance

COURSE: CHT306 CHEMICAL TECHNOLOGY	
CHT 306.1	Sketch and explain the process flow diagram for the manufacture of inorganic chemicals.
CHT 306.2	Explain and draw the process flow diagram of various processes for the production Chlor-alkali and fertiliser industries.
CHT 306.3	Draw and explain the process flow diagram for production of carbon chemicals, surface coatings and cement.
CHT 306.4	Sketch and explain the process flow diagram for the manufacture of glass, pesticides and natural products like soap, pulp and paper etc.
CHT 306.5	Explain the food processing, production of alcohol and pharmaceuticals
CHT 306.5	Explain various process engineering technologies and process flow sheeting methods and select the best process for a product among the alternative methods available in the process industry.


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COURSE: CHT308 COMPREHENSIVE COURSE WORK	
CHT 308.1	Learn to prepare for a competitive examination
CHT 308.2	Comprehend the questions in Chemical Engineering field and answer them with confidence.
CHT 308.3	Communicate effectively with faculty in scholarly environments
CHT 308.4	Analyze the comprehensive knowledge gained in basic courses in the field of Chemical Engineering

COURSE: CHL 332 MASS TRANSFER OPERATIONS LAB	
CHL 332.1	Apply the fundamental knowledge of mass transfer in related practical problems
CHL 332.2	Analyse different mass transfer operations.
CHL 332.3	Experiment with various mass transfer equipments.
CHL 332.4	Examine separation processes such as simple distillation, steam distillation etc. to estimate the composition in products
CHL 332.5	Plan and conduct the experiments and present the experimental data meaningfully
CHL 332.6	Develop teamwork skills

COURSE: CHL 334 CHEMICAL REACTION ENGINEERING LAB	
CHL 334.1	Deduce kinetic equation of homogenous chemical reactions and analyse the factors effecting the reactions
CHL 334.2	Analyse the effect of temperature in chemical equation and validation of Arrhenius law.
CHL 334.3	Determine the kinetics of reaction in ideal reactors- Batch Reactor, PFR and MFR
CHL 334.4	Analyse the principle, working, selection of Chemical Reactors and arriving at designing ideal reactors.
CHL 334.5	Account for non ideality in chemical reactors by calculating residence time distribution
CHL 334.6	Interpret and present the experimental data meaningfully and develop teamwork skills.

SEMESTER 7	
COURSE: CHT 401 CHEMICAL PROCESS EQUIPMENT DESIGN - I	
CHT 401.1	Develop the thermal design of double pipe exchangers for a given heat exchange operation between single-component fluids
CHT 401.2	Develop the thermal design of shell and tube exchangers for a given heat exchange operation between single-component fluids
CHT 401.3	Design tubular condensers for condensation of single-component fluids
CHT 401.4	Develop the process design of evaporators for a given feed solution and terminal conditions
CHT 401.5	Design mechanical draft cooling tower for a given tower fill

COURSE: CHQ413 SEMINAR	
CHQ 413.1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).
CHQ 413.2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
CHQ 413.3	Prepare a presentation about an academic document (Cognitive knowledge level: Create)



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CHQ 413.4	Give a presentation about an academic document (Cognitive knowledge level: Apply).
CHQ 413.5	Prepare a technical report (Cognitive knowledge level Create).

COURSE - CHL411 PROCESS SIMULATION LAB	
CHL411	To select an appropriate property package, operation or a group of operations to simulate a unit operation, a unit process or part of the process plant.
CHL411	To solve and analyse various forms of equations of state and plot the result using process simulators.
CHL411	To solve and analyse various problems on vapour-liquid and reaction equilibria and plot the result using process simulators.
CHL411	To simulate and analyse various types of unit operations and unit processes there by simulating an entire plant using process simulators.
CHL411	To perform dynamic simulation of an operation or a small portion of a process plant to predict the variation of operating parameters on a servo or regulator problem of process control.

COURSE - CHD415 PROJECT PHASE I	
CHD415.1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
CHD415.2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
CHD415.3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
CHD415.4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
CHD415.5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
CHD415.6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).

SEMESTER 8	
COURSE : CHT402 CHEMICAL PROCESSEQUIPMENT DESIGN II	
CHT402.1	Design binary tray distillation column
CHT402.2	Design packed bed absorption column
CHT402.3	Design sieve tray extraction column
CHT402.4	Design direct heat rotary dryer
CHT402.5	Design thin-walled unfired pressure vessels using Indian Standard codes

COURSE - CHD416 PROJECT PHASE II	
CHD416	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).



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	(Cognitive knowledge level: Apply).
CHD416	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply)
CHD416	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
CHD416	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
CHD416	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
CHD416	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).


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DEPARTMENT OF MANAGEMENT STUDIES
COURSE OUTCOMES OF 2020 CURRICULUM

SEMESTER I

COURSE : 20MBA101	
INTRODUCTION TO BUSINESS	
CO 1	Evaluate the importance of Planning and Organising in an Enterprise
CO 2	Analyse the role of Staffing, formation of teams and performance
CO3	Appraise the effectiveness of communication
CO4	Inculcate the foundation of sound decision making
CO5	Evaluate the means of control in an enterprise
COURSE : 20MBA103	
QUANTITATIVE TECHNIQUES FOR MANAGERS	
CO 1	Examine the basics of descriptive statistics for managers
CO 2	Identify the practical applications of probability theory
CO3	Solve business problems with the help of fundamental statistical and theoretical backgrounds
CO4	Formulate various testing methods using statistical backgrounds in business problems for managerial decision making
CO5	Determine the suitability of using correlation and regression analysis in solving business problems
COURSE : 20MBA105	
ORGANIZATIONAL BEHAVIOUR	
CO 1	Understand nature, evolution and approaches to organizational behaviour
CO 2	Analyse individual differences and to change others behaviour through the process of perception, personality, learning and motivation
CO3	Develop team building and leadership skills
CO4	Apply conflict management techniques for improved problem solving and better interpersonal relations
CO5	Enhance individual and organizational productivity through managing stress, culture and change
COURSE : 20MBA107	
BUSINESS ECONOMICS	
CO 1	Evaluate the importance of Economics in Business Decisions.
CO 2	Analyse the Demand and Demand Elasticity in varying market conditions.
CO3	Appraise the Production and Cost Curve in the Short Run and Long Run.
CO4	Explain Price and Output determination in different Market Structures


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CO5	Evaluate the impact of Monetary Policy Measures and Fiscal Policy Measures and Pricing Strategies of Small and Large Business Firms.
COURSE : 20MBA109	
INFORMATION SYSTEM FOR MANAGERS	
CO 1	Demonstrate familiarity with the basic concepts of information systems
CO 2	Identify database models and explain the concept of informed decision-making
CO3	Appraise the integration of business processes with IT
CO4	Apply data and information concepts in enterprise business processes
CO5	Analyse the information security and ethical issues in modern IT environments and methods of tackling them
COURSE : 20MBA111	
ACCOUNTING FOR MANAGERS	
CO 1	Understand the financial transactions, Accounting concepts and principles.
CO 2	Examine and prepare the financial statements of a company.
CO3	Analysis and comparison of financial statements.
CO4	Assess performance of a company using various techniques of Management Accounting
CO5	Analyze performance of a company using various techniques of cost Accounting
COURSE : 20MBA113	
ETHICS, GOVERNANCE AND CORPORATE RESPONSIBILITY	
CO 1	Examine the importance of ethics in business
CO 2	Apply ethical decision making in business management
CO3	Analyze the importance of corporate governance
CO4	Assess the developments in Corporate governance
CO5	Create the sense of corporate social responsibility within oneself
COURSE : 20MBA115	
LEGAL SYSTEM FOR BUSINESS	
CO 1	Examine fundamental legal principles of business contracts
CO 2	Analyse the legal aspects in the formation, running and winding up of business
CO3	Analyze the scope and the issues associated with partnerships, negotiable instruments and cyber law
CO4	Evaluate and analyse the scope and application of sale of goods act and consumer protection act.
CO5	Equip the students with insights on different labour regulations in India
COURSE : 20MBANCI	
EMPLOYABILITY ENHANCEMENT PROGRAMME	
CO 1	Enhance the skills of communication and problem solving
CO 2	Develop job searching, CV writing, interview skills and enterprenurial skills
CO3	Practicing Interpersonal skills, Negotiation and Self-Management
CO4	Develop Team building & Leadership skills through practice
CO5	Attain hands on experience in the areas of Creativity and Critical Thinking

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SEMESTER II

COURSE : 20MBA102 MARKETING MANAGEMENT

CO 1	Evaluate the importance of Marketing Concepts in an Enterprise
CO 2	Analyse the Buyer Behaviour in a marketing Ecosystem
CO3	Appraise the Product and pricing Decisions
CO4	Develop capability to make Distribution Decisions and Promotion Decisions.
CO5	Evaluate the Marketing Control Techniques and Modern Trends in marketing.

COURSE : 20MBA104 FINANCIAL MANAGEMENT

CO 1	Understand the concept, functions and objectives of Financial Management.
CO 2	Examine the sources of business finance and their significance.
CO3	Analyze projects on their risk and financial feasibility.
CO4	Assess the impact of working capital.
CO5	Analyze the dividend policy of a firm

COURSE : 20MBA106 HUMAN RESOURCE MANAGEMENT

CO 1	Understand the core concepts of HRM in an organization
CO 2	Acquire insights on the process of HR planning
CO3	Familiarize the importance of T&D and Performance Management in an organisation
CO4	Analyze the practice of Talent management and Compensation Management
CO5	Apply HRM in maintaining good Employee relations

COURSE : 20MBA108 OPERATIONS MANAGEMENT

CO 1	Develop operations strategies for products and services
CO 2	Measure productivity, forecast, Layout decisions
CO3	Analysis of capacity planning and utilization and application of Quality tools
CO4	Application of supply chain Management techniques and measurement of performance
CO5	Application of World Class Manufacturing and new technologies/trends in operations

COURSE : 20MBA110 OPERATIONS RESEARCH

CO 1	Examine the scope and applications of operations research in business and formulate linear programming models to solve industry problems.
CO 2	Practise mathematical models to allocation problems and analyse business scenarios
CO3	Understand decision making models for analysing business scenarios
CO4	Utilize various inventory models and scientific tools for business analysis
CO5	Apply network analysis and game theory of business scenarios

COURSE : 20MBA112
RESEARCH FOR MANAGERIAL DECISIONS

CO 1	Application of different types of research in functional areas
CO 2	Develop a research design
CO3	Design of proper measurement and scaling tools
CO4	Applied data analysis and interpretation
CO5	Generating project report with worthwhile conclusions and insights for action

COURSE : 20MBA114
ENTREPRENEURSHIP DEVELOPMENT

CO 1	Imbibe the spirit, roles, functions and fundamentals of entrepreneurship in a developing economy.
CO 2	Develop Proficiency in business plan preparation and detailed project report (DPR) preparation and ensure all round development of them.
CO3	Familiarize with the ground realities of starting MSME units and opportunities available in the country.
CO4	Analyze the operation and management of MSME units and develop motivation and entrepreneurial competency to start and run an enterprise successfully.
CO5	Evaluate the scope of e-commerce and the challenges in entrepreneurship

COURSE : 20MBANC2
INTEGRATED DISASTER MANAGEMENT

CO 1	Understand foundations of disasters and associated natural and social phenomenon
CO 2	Develop familiarity with disaster activities from incident response to recovery operations.
CO3	Integrated stakeholders role in disaster preparedness and mitigation plans
CO4	Deployment of community involvement as an essential part of disaster management and Business Continuity Planning after Disaster Recovery
CO5	Deployment of humanitarian assistance to mitigate the effects disaster in the aftermath




SEMESTER III

COURSE : 20MBA201 INTERNATIONAL BUSINESS

CO 1	Recall various concepts of the International Business Environment for an Enterprise.
CO 2	Explain the Importance of socio-cultural environments in international business.
CO3	Identify various International market entry strategies.
CO4	Analyze various trends in global trade and growth of foreign trade in India
CO5	Evaluate the foreign investment and technological development in international business.

COURSE : 20MBA203 BUSINESS ANALYTICS

CO 1	Recall various business analytical models and concepts.
CO 2	Explain business analytical tools and techniques in Finance and Operations Management
CO3	Explain business analytical tools and techniques in Finance and Operations Management
CO4	Analyze business analytical tools and techniques in Marketing and Web Analytics.
CO5	Evaluate business situations using predictive models and analytics.

COURSE : 20MBA237 SECURITY ANALYSIS AND PORTFOLIO MANAGEMENT

CO 1	Recall all the concepts of Security Analysis
CO 2	Choose the various tools of Technical Analysis for stock valuation
CO3	Understand the concepts of Efficient market Hypothesis
CO4	Examine various model relating to portfolio selection
CO5	Evaluate various models of Revising and Evaluating portfolio

COURSE : 20MBA239 MANAGING BANKS AND FINANCIAL INSTITUTIONS

CO 1	Explain the concepts of Banking system and its functions
CO 2	Study the functions of commercial banks
CO3	Understand the role of technology in Banking
CO4	Analyse the risks involved in banking sector
CO5	Assess the newer developments in banking business

COURSE : 20MBA231 FINANCIAL MARKETS AND SERVICES

CO 1	Recall all the concept of Indian Financial System
CO 2	Illustrate the role of financial services in economic development
CO3	Identifying the structure of merchant banking firms
CO4	Analysing various approaches & process of credit rating
CO5	Determine various financial service instrument

COURSE : 20MBA227 REWARD MANAGEMENT

CO 1	Examine compensation framework in the light of different theories of
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	implementation strategies of Brand Marketing Programmes
CO4	Assess the various methods of measuring and interpretation of Brand Performance and the applications of sustaining Brand Equity in Organizations
CO5	Analyze global business opportunities and its implications on a firm's product and branding strategy and to identify the concepts and tools for managing brands over time

COURSE : 20MBA253

B2B MARKETING

CO 1	To identify the distinction between B2B and B2B Product and Services
CO 2	To classify different form of B2B demand patterns
CO3	To identify the role of Partnering/Relationship in business marketing and select suitable firms for B2B collaboration
CO4	To develop an understanding about Industrial Marketing Communication and choose an appropriate training programme for sales force performance
CO5	To examine the special meaning of price in industrial marketing and also know the product life cycle theory and its application to marketing strategies.

COURSE : 20MBA289

ADVANCED PROJECT MANAGEMENT

CO 1	Examine the various project management concepts.
CO 2	Compare and contrast the various roles of project managers, clients and project organisations
CO3	Justify the various project appraisals and budgeting methods.
CO4	Estimate project scheduling through network models and importance of managing time, cost and quality in projects.
CO5	Devise the best practices in project management and value the application of project management software.

COURSE : 20MBA283

HEALTHCARE MANAGEMENT

CO 1	Provide an environment to learn the principles of Hospital Management
CO 2	Demonstrate a clear understanding of concepts, information and techniques at the forefront of the hospital management.
CO3	Recognize how operational problems and situations are handled in practice.
CO4	Formulate ideas, and develop and participate in implementation of plans.
CO5	Critically analyze the various components of health care delivery system.

COURSE : 20MBA351

INTERNSHIP

CO 1	Apply knowledge and skill sets acquired from the internship in organisational functions
CO 2	Develop real-world problem-solving skills by analysing work environment
CO3	Build professional capabilities including right work attitude, self-confidence, interpersonal skills and team work



SEMESTER IV

COURSE : 20MBA202 STRATEGIC MANAGEMENT

CO 1	Recall various concepts relating to strategy formulation.
CO 2	Illustrate the process of Implementation, Evaluation and Control of Strategy
CO3	Identify the internal and external environments of a business for decision making
CO4	Analyze the frames of analysis in each phase of the Process of Strategic Management
CO5	Evaluate the business situations using competitor analysis and portfolio analysis.

COURSE : 20MBA204 INDUSTRY 4.0 AND AI APPLICATIONS FOR BUSINESS

CO 1	Recall the framework for industry 4.0 and business models.
CO 2	Explain the skill set requirements and talent development for the industry 4.0.
CO3	Applying the artificial intelligence models for decision making
CO4	Analyze the insights on machine learning and neural networks
CO5	Assessing IoT and artificial intelligence to business solutions.

COURSE : 20MBA352 PROJECT & COMPREHENSIVE VIVA VOCE

CO 1	Integrate theory and practice of management
CO 2	Understand the dynamics of a specific industry.
CO3	Acquaint themselves with various issues pertaining to an industry.
CO4	Provide a cross-functional perspective of the functioning of a business enterprise and industry

COURSE : 20MBA234 FINANCIAL DERIVATIVES

CO 1	Recall the concept of financial derivatives and risk management
CO 2	Explain the concept of future contracts and computation of value and price of future contracts.


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CO3	Identify the concept of options contracts and create trading strategies involving option contracts.
CO4	Analyse the price of options contracts.
CO5	Evaluate the concept of swaps and computation of value and price of swaps.

**COURSE : 20MBA240
INSURANCE MANAGEMENT**

CO 1	Recall the concepts pertaining to Life Insurance and General insurance
CO 2	Illustrate the key elements of the Life Insurance Products and Services.
CO3	Design the life insurance cover strategy for clients.
CO4	Compare and contrast insurance plans Analyze and use risk management techniques
CO5	Facilitate the compliance required for acquiring the policy and settlement of claims.

**COURSE : 20MBA256
RURAL MARKETING**

CO 1	Apply knowledge of rural markets and governance initiatives to develop marketing strategies that overcome constraints facing rural consumer contexts.
CO 2	Analyse the differences in the rural consumer in terms of social, cultural and technological factors through application of rural marketing research
CO3	Apply STP Strategies in rural markets with specific tools and approaches that enable market success
CO4	Analyse marketing mix strategies to rural markets using methodologies and market orientations that target rural consumers
CO5	Develop models of planned rural marketing frameworks that aid markets and societies centred in rural geographies

**COURSE : 20MBA262
DIGITAL AND SOCIAL MEDIA MARKETING**

CO 1	Identify various organic, paid, owned and earned media sources
CO 2	Compare page optimisation techniques with off page optimisation techniques
CO3	Design an ad according to the google ads structure and also create a suitable landing page
CO4	Determine the most suitable social media platform for a social media campaign
CO5	Illustrate inborn marketing methodology for driving online traffic

**COURSE : 20MBA276
BUSINESS PLANNING FOR SMALL & MEDIUM ENTERPRISES**

CO 1	Examine the key characteristics of SMEs and understand the challenges and the unique position of SMEs in contrast to larger organizations.
CO 2	Understand the importance of defining the right strategy for the SME in a fast changing world and to apply specific tools, models and processes
CO3	Study the strategic management models and theory specific to SMEs
CO4	Understand the concept of EBusiness and emerging techniques in market analysis for SMEs
CO5	Observe the contemporary environment in SMEs

**COURSE : 20MBA212
PERFORMANCE MANAGEMENT**

CO 1	Understand the nature of performance management & compare various theories
CO 2	Realte the principles & methods of performance mangement

CO3	Identify different issues in performance management
CO4	Analyse the process of performance management
CO5	Develop Performance management system
COURSE : 20MBA218	
INDUSTRIAL PSYCHOLOGY	
CO 1	Appraise the basics of Industrial psychology
CO 2	Analyse & manage the perception, learning and motivation of employees
CO3	Evaluate dimensions of emotions and emotional intelligence
CO4	Manage dynamics of Individual & groups
CO5	Assess & manage mentoring and counselling services in the organisations

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DEPARTMENT OF AI&ML

SEMESTER 5

AMT301 DATA HANDLING AND VISUALIZATION

AMT301.1	Summarize the key techniques and theory used in visualization
AMT301.2	Design and use various methodologies present in data visualization
AMT301.3	Employ various processes and tools for data visualization.
AMT301.4	Use interactive data visualization to make inferences
AMT301.5	Recognize the process involved and security issues present in data visualization

AMT 305 INTRODUCTION TO MACHINE LEARNING

AMT 305.1	Illustrate Machine Learning concepts and basics of supervised learning concepts.
AMT 305.2	Describe dimensionality reduction techniques and supervised learning concepts
AMT 305.3	Solve real life problems using appropriate machine learning models and evaluate the performance measures and Illustrate the concepts of Multilayer neural network
AMT 305.4	Illustrate basics of parameter estimation models and the working of classifier SVM classifier model
AMT 305.5	Describe unsupervised learning concepts

AIT 307 INTRODUCTION TO ARTIFICIAL INTELLIGENCE

AIT 307.1	Explain the fundamental concepts of intelligent systems and their architecture.
AIT 307.2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems.
AIT 307.3	Solve Constraint Satisfaction Problems using search techniques.
AIT 307.4	Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems.
AIT 307.5	Illustrate different types of learning techniques used in intelligent systems

CST 309 MANAGEMENT OF SOFTWARE SYSTEMS

CST 309.1	Demonstrate Traditional and Agile Software Development approaches
CST 309.2	Prepare Software Requirement Specification and Software Design for a given problem.

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CST 309.3	Justify the significance of design patterns and licensing terms in software development, prepare testing, maintenance and DevOps strategies for a project
CST 309.4	Make use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project, with a traditional/agile framework.
CST 309.5	Utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices

AML 311 PYTHON AND MACHINE LEARNING LAB

AML 311.1	Develop applications in Python programming.
AML 311.2	Implement machine learning algorithms using packages and libraries in Python for various applications.
AML 311.3	Implement python programs for supervised learning methods through Neural network, Regression and classification.
AML 311.4	Implement clustering algorithms.
AML 311.5	Apply dimensionality reduction as a dataset preprocessing step

AIL 333 AI ALGORITHM LAB

AIL 333.1	State the basics of learning problems with hypothesis and version spaces
AIL 333.2	Demonstrate real-world problems as state space problems, optimization problems or constraint satisfaction problems
AIL 333.3	Simulate given problem scenario and analyze its performance.
AIL 333.4	Develop programming solutions for given problem scenario
AIL 333.5	Design and develop an expert system by using appropriate tools and techniques.

CST 303 COMPUTER NETWORKS

CST 303.1	Explain the features of computer networks, protocols, and network design models
CST 303.2	Describe the fundamental characteristics of the physical layer and identify the usage in network communication
CST 303.3	Explain the design issues of data link layer, link layer protocols, bridges and switches
CST 303.4	illustrate wired LAN protocols (IEEE 802.3) and wireless LAN protocols (IEEE 802.11)
CST 303.5	Select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network


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CST 303.6	Illustrate the functions and protocols of the network layer, transport layer, and application layer in Inter-networking
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SEMESTER 6

AMT 302 CONCEPTS IN NATURAL LANGUAGE PROCESSING

AMT 302.1	Summarize basic concepts and learning methods for NLP
AMT 302.2	Demonstrate the relevance of pre-processing methods on text data
AMT 302.3	Compare different language modelling techniques
AMT 302.4	Make use of NLP techniques in Text Classification and Information Retrieval
AMT 302.5	Explain Information Extraction, Relation Detection, QA Systems and Machine Translation

AIT304 ROBOTICS AND INTELLIGENT SYSTEM

AIT304.1	Understand the concepts of manipulator and mobile robotics
AIT304.2	Choose the suitable sensors, actuators and control for robot design.
AIT304.3	Developing kinematic model of mobile robot and understand robotic vision intelligence
AIT304.4	Discover the localization and mapping methods in robotics.
AIT304.5	Plan the path and navigation of robot by applying artificial intelligence algorithm.

CST 306 ALGORITHM ANALYSIS AND DESIGN

CST 306.1	Analyze any given algorithm and express its time and space complexities in asymptotic notations.
CST 306.2	Derive recurrence equations and solve it using Iteration, Recurrence Tree, Substitution and Master's Method to compute time complexity of algorithms
CST 306.3	Illustrate Graph traversal algorithms & applications and Advanced Datastructures like AVL trees and Disjoint set operations.
CST 306.4	Demonstrate Divide-and-conquer, Greedy Strategy, Dynamic programming, Branch-and Bound and Backtracking algorithm design techniques


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DEPARTMENT OF AI&ML

CST 306.5	Classify a problem as computationally tractable or intractable, and discuss strategies to address intractability
CST 306.6	Identify the suitable design strategy to solve a given problem

AIT 362 PROGRAMMING IN R

AIT 362.1	Illustrate uses of conditional and iterative statements in R programs.
AIT 362.2	Write, test and debug R programs
AIT 362.3	Illustrate the use of Probability distributions and basic statistical functions.
AIT 362.4	Visualize different types of data
AIT 362.5	Comprehend regression modeling using R

AML332 NATURAL LANGUAGE PROCESSING LAB


AML332.1	Apply the concept of natural language processing (NLP) using Natural Language Toolkit (NLTK).
AML332.2	Build text corpora with tokenization, Stemming, Lemmatization and apply visualization techniques.
AML332.3	Evaluate the classifiers and choose the best classifier.
AML332.4	Create Artificial Intelligence applications for text data.

HUT 300 INDUSTRIAL ECONOMICS & FOREIGN TRADE

HUT 300.1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare.
HUT 300.2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
HUT 300.3	Determine the functional requirement of a firm under various competitive conditions.
HUT 300.4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.
HUT 300.5	Determine the impact of changes in global economic policies on the business opportunities of a firm.

AMT 308 COMPREHENSIVE COURSE WORK

AMT 308.1	Comprehend the concepts and applications of data structures
AMT 308.2	Comprehend the concepts, functions and algorithms in operating system


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AMT 308.3	Comprehend the concepts of machine learning
AMT 308.4	Comprehend the fundamental principles of database design and manipulation
AMT 308.5	Comprehend the concepts of artificial intelligence


Coordinator


HEAD OF DEPARTMENT
Dept of Artificial Intelligence &
Machine Learning
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SEMESTER VI	
COURSE - CHT322 ENERGY ENGINEERING	
CHT322. 1	Identify different sources of energy , analyse the energy scenario and understand different conventional energy production systems
CHT322. 2	Explain the concepts of solar and ocean energy conversion
CHT322. 3	Explain the Wind and biomass energy conversion technologies
CHT322. 4	Explain the working and types of fuel cells and MHD systems
CHT322. 5	Explain the concepts of energy conservation and energy audit and apply the knowledge in process plants and daily life

SEMESTER VII	
CET445 NATURAL DISASTERS & MITIGATION	
CET 445. 1	Explain interaction between subsystems of earth that give rise to hazards and their potential for disasters
CET 445.2	Explain the evolving concepts and thoughts of management of hazards and disaster
CET 445.3	Analyze the causes behind natural disasters and evaluate their magnitude impacts
CET 445.4	Create management plans for hazards and disasters. and understand the roles of agencies involved.
CET 445.5	Create management plans for hazards and disasters. and understand the roles of agencies involved.

COURSE - CHT413 FOOD PROCESSING AND TECHNOLOGY	
CHT413. 1	Explain the importance of food quality, nutritive aspects, food additives and standards
CHT413. 2	Discuss the food processing and packing methods
CHT413. 3	Select suitable food preservation techniques


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CHT413. 4	Explain the production and utilization of food products from dairy, meat, poultry and fish industries
CHT413. 5	Describe treatment and disposal of food processing wastes

SEMESTER VIII	
COURSE - CHT414 AIR POLLUTION MONITORING & CONTROL	
CHT414. 1	Define the sources, classifications, effects of air pollutants.
CHT414. 2	Describe the ambient air quality standards as well as sampling and analysis of air pollutants from emission sources.
CHT414. 3	Understand the concepts of atmospheric dispersion characteristics and nature based on lapse rate and inversion.
CHT414. 4	Explain the selection strategies and types of equipment and its design to control particulates and gaseous pollutants.
CHT414. 5	Explain the indoor air pollution sources, measurements, standards and control methods.


COURSE - CHT418 SOLID WASTE MANAGEMENT	
CHT418. 1	Explain municipal solid waste management systems with respect to its physical, chemical and biological properties.
CHT418. 2	Select appropriate methods for solid waste collection and optimize the route for transportation.
CHT418. 3	Understand the design and operation of landfills.
CHT418. 4	Compare disposal methods of MSW by applying specific criteria.
CHT418. 5	Understand the recovery and recycling methods of waste management.


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COURSE - CHT476 ENZYME ENGINEERING	
CHT476. 1	Classify enzymes along with their applications in different fields.
CHT476. 2	Analyze enzyme kinetics and apply the same in the design of reactors..
CHT476. 3	Outline the types and methods of immobilization of enzymes.
CHT476. 4	Summarize the various types of enzyme reaction systems and reactors.
CHT476. 5	Explain the application of enzymes in health care, environment and industry.


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MANGALAM COLLEGE OF ENGINEERING
DEPARTMENT OF BASIC SCIENCE AND HUMANITIES
COURSE OUTCOMES OF ALL COURSES OFFERED BY BASIC SCIENCE AND HUMANITIES
DEPARTMENT (2019 SCHEME)

MAT101	LINEAR ALGEBRA AND CALCULUS
CO 1	solve systems of linear equations, diagonalize matrices and characterise quadratic forms
CO 2	compute the partial and total derivatives and maxima and minima of multivariable functions.
CO 3	compute multiple integrals and apply them to find areas and volumes of geometrical shapes, mass and centre of gravity of plane laminae
CO 4	perform various tests to determine whether a given series is convergent, absolutely convergent or
CO 5	determine the Taylor and Fourier series expansion of functions and learn their applications.
MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS
CO 1	Compute the derivatives and line integrals of vector functions and learn their applications
CO 2	Evaluate surface and volume integrals and learn their inter-relations and applications.
CO 3	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients
CO 4	Compute Laplace transform and apply them to solve ODEs arising in engineering
CO 5	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering
MAT201	PARTIAL DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS
CO 1	Understand the concept and the solution of partial differential equation.
CO 2	Analyse and solve one dimensional wave equation and heat equation.
CO 3	Understand complex functions, its continuity differentiability with the use of Cauchy-Riemann equations.
CO 4	Evaluate complex integrals using Cauchy's integral theorem and Cauchy's integral formula, understand the series expansion of analytic function
CO 5	Understand the series expansion of complex function about a singularity and Apply residue theorem to compute several kinds of real integrals.
MAT 203	DISCRETE MATHEMATICAL STRUCTURES

CO 1	Check the validity of predicates In Propositional and Quantified Propositional Logic using truth tables, deductive reasoning and inference theory on Propositional Logic
CO 2	Solve counting problems by applying the elementary counting techniques - Rule of Sum, Rule of Product, Permutation, Combination, Binomial Theorem, Pigeonhole Principle and Principle of Inclusion
CO 3	Classify binary relations into various types and illustrate an application for each type of binary relation, in Computer Science, illustrate an application for Partially Ordered Sets and Complete Lattices, in
CO 4	Explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients
CO 5	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups
MAT 202	PROBABILITY, STATISTICS AND NUMERICAL METHODS
CO 1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.
CO 2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena.
CO 3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population
CO 4	Compute roots of equations, evaluate definite integrals and perform Interpolation on given numerical data using standard numerical techniques
CO 5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.
MAT216	MATHEMATICAL FOUNDATION FOR MACHINE LEARNING
CO 1	Make use of the concepts, rules and results about linear equations, matrix algebra, vector spaces
CO 2	Make use of the concepts eigenvalues and eigenvectors and orthogonality and diagonalization to solve computational problems
CO 3	Perform calculus operations on functions of several variables and matrices, including partial derivatives and gradients
CO 4	Utilize the concepts, rules and results about probability, random variables, additive and multiplicative rules, conditional probability, probability distributions and Baye's theorem to find solutions of
CO 5	Train Machine Learning Models using unconstrained and constrained optimization methods
MAT 204	PROBABILITY, RANDOM PROCESSES AND NUMERICAL METHODS

CO 1	Understand the concept, properties and important models of discrete random variables and, using them, analyse suitable random phenomena.
CO 2	Understand the concept, properties and important models of continuous random variables and, using them, analyse suitable random phenomena
CO 3	Analyse random processes using autocorrelation, power spectrum and Poisson process model as appropriate.
CO 4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data using standard numerical techniques
CO 5	Apply standard numerical techniques for solving systems of equations, fitting curves on given numerical data and solving ordinary differential equations.
MAT 206	GRAPH THEORY
CO 1	Understand the basic concept in Graph theory.
CO 2	Formulate and prove fundamental theorems on Eulerian graphs and Hamiltonian graphs
CO 3	Apply theorems and algorithms on trees.
CO 4	Understand planar graphs and its properties and to detect planarity of a given graph
CO 5	Demonstrate the knowledge of fundamental concepts of matrix representation of graphs and colouring problems
PHT 100	ENGINEERING PHYSICS A
CO 1	Compute the quantitative aspects of waves and oscillations in engineering systems.
CO 2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
CO 3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
CO 4	Classify the properties of magnetic materials and apply vector calculus to static magnetic fields and use Maxwell's equations to diverse engineering problems
CO 5	Analyze the principles behind various superconducting applications, explain the working of solid state lighting devices and fibre optic communication system
PHL 120	ENGINEERING PHYSICS LAB
CO 1	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
CO 2	Understand the need for precise measurement practices for data recording

CO 3	Understand the principle, concept, working and applications of relevant technologies and comparison of results with theoretical calculations
CO 4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results
CO 5	
PHT 110	ENGINEERING PHYSICS B
CO 1	Compute the quantitative aspects of waves and oscillations in engineering systems.
CO 2	Apply the interaction of light with matter through interference, diffraction and identify these phenomena in different natural optical processes and optical instruments.
CO 3	Analyze the behaviour of matter in the atomic and subatomic level through the principles of quantum mechanics to perceive the microscopic processes in electronic devices.
CO 4	Apply the knowledge of ultrasonics in non-destructive testing and use the principles of acoustics to explain the nature and characterization of acoustic design and to provide a safe and healthy
CO 5	Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications
CYT 100	ENGINEERING CHEMISTRY
CO 1	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields
CO 2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
CO 3	Apply the knowledge of analytical method for characterizing a chemical mixture or a compound. Understand the basic concept of SEM for surface characterisation of nanomaterials.
CO 4	Learn about the basics of stereochemistry and its application. Apply the knowledge of conducting polymers and advanced polymers in engineering.
CO 5	Study various types of water treatment methods to develop skills for treating wastewater.
CYL 120	ENGINEERING CHEMISTRY LAB
CO 1	Understand and practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses
CO 2	Develop skills relevant to synthesize organic polymers and acquire the practical skill to use TLC for the identification of drugs
CO 3	Develop the ability to understand and explain the use of modern spectroscopic techniques for analysing and interpreting the IR spectra and NMR spectra of some organic compounds

CO 4	Acquire the ability to understand, explain and use instrumental techniques for chemical analysis
CO 5	Learn to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments
CO 6	Function as a member of a team, communicate effectively and engage in further learning. Also understand how chemistry addresses social, economical and environmental problems and why it is an
HUN 101	LIFE SKILLS
CO 1	Define and identify different life skills required in personal and professional life
CO 2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
CO 3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
CO 4	Take part in group discussions
CO 5	Use appropriate thinking and problem solving techniques to solve new problems
CO 6	Understand the basics of teamwork and leadership
HUT 300	Industrial Economics & Foreign Trade
CO 1	Explain the problem of scarcity of resources and consumer behaviour, and to evaluate the impact of government policies on the general economic welfare
CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production.
CO 3	Determine the functional requirement of a firm under various competitive conditions.
CO 4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society.
CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm.
HUN 102	PROFESSIONAL COMMUNICATION
CO 1	Develop vocabulary and language skills relevant to engineering as a profession
CO 2	Analyze, interpret and effectively summarize a variety of textual content
CO 3	Create effective technical presentations
CO 4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus

CO 5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
CO 6	Create professional and technical documents that are clear and adhering to all the necessary conventions


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DEPARTMENT OF COMPUTER APPLICATIONS

COURSE OUTCOMES OF ALL COURSES(2020 SCHEME)

SEMESTER I

1. 20MCA101 MATHEMATICAL FOUNDATIONS FOR COMPUTING

20MCA101.1	Understand mathematical reasoning in order to read, comprehend and construct mathematical arguments.
20MCA101.2	Count or enumerate objects and solve counting problems and analyze algorithms.
20MCA101.3	Solve problems in almost every conceivable discipline using graph models.
20MCA101.4	Solve the linear system of equations and Calculate the eigen values and eigen vectors of matrices.
20MCA101.5	Apply the principles of correlation and regression in practical problems.

2. 20MCA103 DIGITAL FUNDAMENTALS & COMPUTER ARCHITECTURE

20MCA103.1	Apply the basics of digital electronics to design and realize simple combinational logic circuits
20MCA103.2	Apply the digital electronics principles to design sequential logic circuits.
20MCA103.3	Understand the different design features of computer architecture, Five key components of a computer, processor and memory making technologies, addressing modes & instruction formats.
20MCA103.4	Understand Processor logic design conventions and data path, pipelining and hazards, I/O organization, Interrupts and direct memory access
20MCA103.5	Understand and different types of memories - RAM, ROM, Cache memory, virtual memory etc. Apply the different memory design techniques.
20MCA103.6	Understand the concept of single board computers like Arduino, Raspberry Pi etc. and apply the same in practical applications. Mapping of course outcomes with program outcome

3. 20MCA105 ADVANCED DATA STRUCTURES

20MCA105.1	Remember the Basic Data Structures and understand the Set Data Structure and its implementation.
20MCA105.2	Understand Advanced Tree Structures for the design of efficient algorithms
20MCA105.3	Understand Advanced Heap Structures suitable for solving Computational problems involving Optimisation and analysing these data structures using amortised analysis
20MCA105.4	Understand Advanced Graph algorithms suitable for solving advanced computational problems.
20MCA105.5	Understand the basic operation of Blockchain along with the data structures used in it and the challenges in Blockchain data.

4. 20MCA107 ADVANCED SOFTWARE ENGINEERING

20MCA107.1	Get a full view of the Software life cycle
20MCA107.2	Gain a deep knowledge of Software Planning, Analysis and Design and Software Engineering Models
20MCA107.3	Have a great comprehension of Coding Practices, Version Control using 'git' and Software Quality
20MCA107.4	Acquire ample grasp of Design Patterns
20MCA107.5	Get deeply familiarised with Software Testing and its automation
20MCA107.6	Start using Agile Methodology
20MCA107.8	Begin to apply CI/CD techniques in Software development

5. 20MCA131 PROGRAMMING LAB

20MCA131.1	Understands basics of Python Programming language including input/output functions, operators, basic and collection data types
20MCA131.2	Implement decision making, looping constructs and functions
20MCA131.3	Design modules and packages - built in and user defined packages
20MCA131.4	Implement object-oriented programming and exception handling.
20MCA131.5	Create files and form regular expressions for effective search operations on strings and files.

6. 20MCA133 WEB PROGRAMMING LAB

20MCA133.1	Explore markup languages features and create interactive web pages using them.
20MCA133.2	Learn and design client-side validation using scripting languages.
20MCA133.3	Design front end web page and connect to the back-end databases.
20MCA133.4	Do Client-side & Server-side scripting
20MCA133.5	Develop Web Applications

7. 20MCA135 DATA STRUCTURES LAB

20MCA133.1	Use Debuggers, Profilers and advanced Compiler options.
20MCA133.2	Implement the Set and Disjoint Set Data Structures.
20MCA133.3	Understand the practical aspects of Advanced Tree Structures.
20MCA133.4	Realise Modern Heap Structures for effectively solving advanced Computational problems.
20MCA133.5	Implement Advanced Graph algorithms suitable for solving advanced computational problems.



SEMESTER 2

1. 20MCA102 ADVANCED DATABASE MANAGEMENT SYSTEMS

20MCA102.1	Understand the fundamentals of relational database systems including: data models, database architectures and ER features.
20MCA102.2	Analyze and apply the different normalization techniques.
20MCA102.3	Assess the basic issues of transaction processing and concurrency control.
20MCA102.4	Understand the roles that databases play in organizations and familiarize with basic database storage, file organization, database accessing techniques..
20MCA102.5	Understand the basics of query processing, object-oriented, distributed databases.
20MCA102.6	Analyze non-relational database systems and structures and XML.

2. 20MCA104 ADVANCED COMPUTER NETWORKS

20MCA104.1	Comprehend the terminology and concepts of basic communication model, analyse the protocol layers and design application layer protocols.
20MCA104.2	Understand and analyse the various transport layer protocols.
20MCA104.3	Compare and contrast various routing algorithms in the network layer.
20MCA104.4	Understand and analyse the concepts of link layer and physical layer
20MCA104.5	Understand how modern cellular and wireless networks work

3. 20MCA162 APPLIED STATISTICS

20MCA162.1	Apply the concept of discrete probability distributions in determining the parameters of the distribution and hence to solve different problems
20MCA162.2	Apply the concept of continuous probability distribution in solving different problems
20MCA162.3	Apply the principles of correlation and regression in practical problems.
20MCA162.4	Develop confidence intervals for various problems.
20MCA162.5	Test the given hypothesis on the basis of known criteria.

4. 20MCA164 ORGANIZATIONAL BEHAVIOUR

20MCA164.1	Identify managers' challenges and opportunities in applying OB concepts.
20MCA164.2	Analyse various characteristics of individual behaviour and its impact on organizational performance.
20MCA164.3	Acquire knowledge about the complexities associated with management of individual behaviour in the organization.
20MCA164.4	Understand group behaviour and develop inter-personal skills and group dynamics
20MCA164.5	Understand organizational structures and analyze the behavioral implications of different organizational designs.

5. 20MCA166 FUNCTIONAL PROGRAMMING

20MCA166.1	Understand the principles of functional programming (Module 1)
20MCA166.2	Write purely functional programs, using recursion, pattern matching, and higher- order functions ((Module 2)
20MCA166.3	Design immutable data structures like lists. (Module 3)
20MCA166.4	Understand generic types for functional programs (Module 4)
20MCA166.5	Write programs using Haskell (Module 5)

6. 20MCA168 VIRTUALISATION CONTAINERS

20MCA168.1	Understand the basics of virtualization technology, architecture, limitations and applications.
20MCA168.2	Apply Networking Principles to setup virtual machines and connect to the



	network
20MCA168.3	Understand the basics of VM life cycle, VM migrations, VM scheduling and load balancing
20MCA168.4	Understand Container fundamentals including how to configure and set up a container
20MCA168.5	Understand the basics of security, troubleshooting and monitoring aspects in container technology
20MCA168.6	Apply the knowledge in Virtualization and docker to setup VM and dockers

7. 20MCA172 ADVANCED OPERATING SYSTEMS

20MCA172.1	Identify synchronization problems in operating systems and issues in distributed systems.
20MCA172.2	Explain classification of mutual exclusion algorithms and security violations.
20MCA172.3	Explain the design of distributed shared memory and issues in load distribution.
20MCA172.4	Explain design issues and synchronization in multiprocessor systems.
20MCA172.5	Explain synchronization and concurrency control in database systems.

8. 20MCA182 BUSINESS MANAGEMENT

20MCA182.1	Understand management as a process.
20MCA182.2	Critically analyse and evaluate management theories and practices
20MCA182.3	Perform planning and organising for an organisation
20MCA182.4	Do staffing and related human resource development function
20MCA182.5	Take proper decisions to get competitive advantage
20MCA182.6	Understand basic concepts in book keeping and accounting.

9. 20MCA184 EMBEDDED SYSTEMS

20MCA184.1	Understand the basic concepts of Embedded Systems and its Applications.
20MCA184.2	Demonstrate the role of individual components involved in a typical embedded system.
20MCA184.3	Learn about the co-design approach for embedded hardware and firmware development.
20MCA184.4	Understand the concepts involved in Embedded System Design and development Process.
20MCA184.5	Learn about techniques used in the Integration and Testing of Embedded Hardware and Firmware.
20MCA184.6	Understand the basic concepts of RTOS based Embedded System Design

10. 20MCA186 COMPUTER GRAPHICS

20MCA186.1	Apply foundational knowledge in computer graphics to work with Graphics APIs.
20MCA186.2	Explain various shape drawing algorithms and transformations.
20MCA186.3	Explain viewing concepts and follow the workflow in computer graphics pipeline.
20MCA186.4	Explain different shading, texture mapping and data structures used in computer graphics.
20MCA186.5	Apply concepts in Raytracing to better understand and design computer graphics models.
20MCA186.6	Apply concepts in colorimetry and radiometry to work with images

11. 20MCA188 ARTIFICIAL INTELLIGENCE

20MCA188.1	Apply the steps needed to provide a formal specification for solving the problem.
20MCA188.2	Apply and analyze the different types of control and heuristic search methods



20MCA188.2	Apply and analyze the different types of control and heuristic search methods to solve problems
20MCA188.3	Understand various Game theory problems & Knowledge structures C
20MCA188.4	Formulate knowledge representation and examine resolution in predicate and propositional logic
20MCA188.5	Apply feasible planning and learning techniques to solve non-trivial problems
20MCA188.6	Analyze expert systems & fuzzy operations to solve real life problems.

12. 20MCA192 IPR AND CYBER LAWS

20MCA192.1	Explain the fundamentals of IPR and patents.
20MCA192.2	Apply intellectual property related tools such as trademark and copyright to real problems.
20MCA192.3	Discuss Industrial designs, trade secret and geographic Indications. CO 4
20MCA192.4	Describe laws governing cyberspace and analyze the role of Internet Governance in framing policies for Internet security.
20MCA192.5	Discuss different types of cybercrimes and penalties under IT Act

13. 20MCA132 OBJECT ORIENTED PROGRAMMING LAB

20MCA132.1	Understand object-oriented concepts and design classes and objects to solve problems
20MCA132.2	Implement arrays and strings.
20MCA132.3	Implement object-oriented concepts like inheritance, overloading and interfaces
20MCA132.4	Implement packages, exception handling, multithreading and generic programming. Use java.util package and Collection framework
20MCA132.5	Develop applications to handle events using applets
20MCA132.6	Develop applications using files and networking concepts

14. 20MCA 134 ADVANCED DBMS LAB

20MCA134.1	Design and build a simple relational database system and demonstrate competence with the fundamentals tasks involved with modelling, designing and implementing a database.
20MCA134.2	Apply PL/SQL for processing databases.
20MCA134.3	Comparison between relational and non-relational (NoSQL) databases and the configuration of NoSQL Databases.
20MCA134.4	Apply CRUD operations and retrieve data in a NoSQL environment.
20MCA134.5	Understand the basic storage architecture of distributed file systems
20MCA134.6	Design and deployment of NoSQL databases with real time requirements

15. 20MCA136 NETWORKING & SYSTEM ADMINISTRATION LAB

20MCA136.1	Install and configure common operating systems
20MCA136.2	Perform system administration tasks.
20MCA136.3	Install and manage servers for web applications.
20MCA136.4	Write shell scripts required for system administration.
20MCA136.5	Acquire skill sets required for a DevOps



SEMESTER 3

1. 20MCA201 DATA SCIENCE & MACHINE LEARNING

20MCA201.1	Discuss the fundamental concepts of data science and data visualization techniques.
20MCA201.2	Explain the basics of machine learning and use lazy learning and probabilistic learning algorithms to solve data science problems
20MCA201.3	Describe decision trees, classification rules & regression methods and how these algorithms can be applied to solve data science problems.
20MCA201.4	Solve data science problems using neural networks and support vector machines.
20MCA201.5	Discuss clustering using k-means algorithm and evaluate & improve the performance of machine learning classification models.

2. 20MCA203 DESIGN & ANALYSIS OF ALGORITHMS

20MCA203.1	Discuss the basic concepts in computer algorithms and their analysis & design using Divide and Conquer.
20MCA203.2	Explain the concepts of Greedy Strategy and Dynamic Programming to use it in solving real world problems.
20MCA203.3	Explain the Branch & Bound technique, Backtracking technique and Lower bounds.
20MCA203.4	Describe the fundamental concepts of Computational Complexity and Network Flows.
20MCA203.5	Discuss the concepts of Approximation and Randomised Algorithms.

3. 20MCA261 OPERATIONAL RESEARCH

20MCA261.1	Solve different types of Linear Programming Problems.
20MCA261.2	Apply the concept of linear programming problems in real life.
20MCA261.3	Solve different decision-making problems using optimization techniques.
20MCA261.4	Use PERT and CPM to analyse project network management.
20MCA261.5	Identify suitable queuing model and solve queuing problems

4. 20MCA263 CYBER SECURITY & CRYPTOGRAPHY

20MCA263.1	Explain various types of security attacks, security mechanisms, security services and classical encryption techniques.
20MCA263.2	Make use of Symmetric and Asymmetric encryption techniques to solve cryptographic problems.
20MCA263.3	Describe the concepts of message authentication codes, hash functions and digital signing techniques for ensuring secure transactions.
20MCA263.4	Discuss security services in Application, Transport and Network layers.
20MCA263.5	Explain common web application security vulnerabilities and various prevention mechanisms.

5. 20MCA265 CLOUD COMPUTING

20MCA265.1	Understand the basic concepts in cloud computing and OpenStack logical architecture
20MCA265.2	Discuss OpenStack cloud controller and common services
20MCA265.3	Compare different OpenStack compute service components and storage types
20MCA265.4	Describe the OpenStack Networking- Connection types and networking services.
20MCA265.5	Discuss orchestration, HA and failover in OpenStack

6. 20MCA267 CYBER FORENSICS

20MCA267.1	Explain a computer crime and the concept of rules or policy violations.
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20MCA267.2	Gather evidences and preserve the collected evidence with the required knowledge on various storage format choices
20MCA267.3	Describe digital storage and file systems and extract data using Autopsy.
20MCA267.4	Explain mobile device forensics and practice data acquisition procedures for network forensics using Wireshark.
20MCA267.5	Prepare forensics reports both using tools and manually and explain ethics and code for expert witness.

7. 20MCA269 COMPILER DESIGN

20MCA269.1	Explain different phases of compiler and perform lexical analysis using the concepts of regular expressions and finite automata.
20MCA269.2	Develop top down and bottom-up parsers to perform syntax analysis using context free grammar.
20MCA269.3	Explain syntax directed translation schemes and type checking for a given grammar.
20MCA269.4	Distinguish different intermediate code representations and generate intermediate code for statements in high level languages
20MCA269.5	Describe various code optimization techniques and generate machine dependent code.

8. 20MCA281 INTERNET OF THINGS

20MCA281.1	Describe the main concepts and features of the IOT paradigm.
20MCA281.2	Discuss Fog computing, TinyOS - nesC and programming frameworks for IOT
20MCA281.3	Describe the data management techniques applied to the IOT environment
20MCA281.4	Explain security, and privacy in IOT environments
20MCA281.5	Discuss key enablers and solutions to enable practical IoT

9. 20MCA283 DEEP LEARNING

20MCA283.1	Explain the basic concepts of deep learning. Level 2: Understand CO 2
20MCA283.2	Design neural networks using TensorFlow
20MCA283.3	Solve real world problems with CNN.
20MCA283.4	Solve real world problems with RNN
20MCA283.5	Describe the concepts of GAN.

10. 20MCA285 DIGITAL IMAGE PROCESSING

20MCA285.1	Discuss the fundamental concepts of digital image processing, image formation and representation of images
20MCA285.2	Summarise image enhancement methods in the spatial domain
20MCA285.3	Explain image transforms and image smoothing & sharpening using various kinds of filters in frequency domain
20MCA285.4	Describe various methods in image restoration and compression.
20MCA285.5	Discuss morphological basics and image segmentation methods

11. 20MCA287 BIOINFORMATICS

20MCA287.1	Explain the fundamentals of Computational Biology and Bioinformatics.
20MCA287.2	Classify various biological databases.
20MCA287.3	Use suitable algorithm for Biological Sequence Analysis and make use of database search tools.
20MCA287.4	Discuss Gene structure and expression of Prokaryotic and Eukaryotes.
20MCA287.5	Apply data mining & machine learning methods to analyse and visualize biological data.



12. 20MCA289 SOCIAL NETWORK ANALYSIS

20MCA289.1	Explain the basic concepts of semantic web and social network analysis.
20MCA289.2	Describe the ontology-based knowledge representation techniques in social network.
20MCA289.3	Discuss aggregation of social network information and representation of social individuals and social relationships.
20MCA289.4	Describe the structure of the Web and Facebook as a graph and the algorithms for searching and community discovery.
20MCA289.5	Explain the general architecture of a search engine and specifically the Google search engine architecture.

13. 20MCA241 DATA SCIENCE LAB

20MCA241.1	Use different python packages to perform numerical calculations, statistical computations and data visualization
20MCA241.2	Use different packages and frameworks to implement regression and classification algorithms
20MCA241.3	Use different packages and frameworks to implement text classification using SVM and clustering using k-means
20MCA241.4	Implement convolutional neural network algorithm using Keras framework
20MCA241.5	Implement programs for web data mining and natural language processing using NLTK

14. 20MCA243 MOBILE APPLICATION DEVELOPMENT LAB

20MCA243.1	Design and develop user interfaces for mobile apps using basic building blocks, UI components and application structure using Emulator
20MCA243.2	Write simple programs and develop small applications using the concepts of UI design, layouts and preferences
20MCA243.3	Develop applications with multiple activities using intents, array adapter, exceptions and options menu.
20MCA243.4	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes
20MCA243.5	Develop mobile applications using SQLite.

15. 20MCA245 MINIPROJECT

20MCA245.1	Identify a real-life project which is useful to society / industry Level
20MCA245.2	Interact with people to identify the project requirements
20MCA245.3	Apply suitable development methodology for the development of the product / project
20MCA245.4	Analyse and design a software product / project
20MCA245.5	Test the modules at various stages of project development
20MCA245.6	Build and integrate different software modules
20MCA245.7	Document and deploy the product / project Level

16. 20MCANC3 Domain Expert Workshops

20MCANC3.1	Associate real-life problems with IT solutions
20MCANC3.2	Describe latest developments in IT field
20MCANC3.3	Interact with technical experts
20MCANC3.4	Prepare technical documents
20MCANC3.5	Present a topic before an audience



SEMESTER 4

1. 20MCA242 COMPREHENSIVE VIVA

20MCA242.1	Articulate the concepts in the core courses learned through this programme
20MCA242.2	Attend technical interviews with confidence.
20MCA242.3	Interpret questions and answer them with clarity.
20MCA242.4	Make use of the concepts learned through this programme in future.

2. 20MCA244 SEMINAR

20MCA244.1	Annotate the ideas presented in technical papers
20MCA244.2	Comprehend a concept by referring different technical documents
20MCA244.3	Prepare technical documents
20MCA244.4	Present a topic before an audience
20MCA244.5	Interact with the audience

3. 20MCA246 MAIN PROJECT

CO	Course outcome
20MCA245.1	Identify a real-life project which is useful to society / industry Level
20MCA245.2	Interact with people to identify the project requirements
20MCA245.3	Apply suitable development methodology for the development of the product / project
20MCA245.4	Analyse and design a software product / project
20MCA245.5	Test the modules at various stages of project development
20MCA245.6	Build and integrate different software modules
20MCA245.7	Document and deploy the product / project Level

