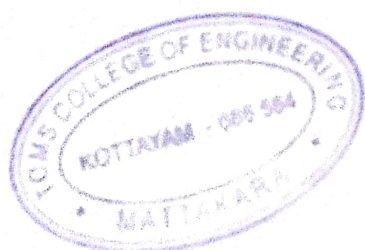


PROGRAMME OUTCOMES

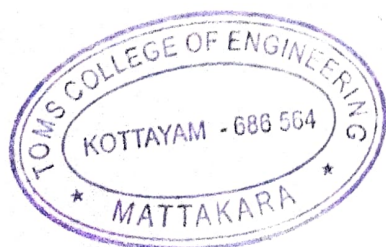


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TOMS COLLEGE OF ENGINEERING
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KOTTAYAM KS LALA - 686 564

CHEMICAL ENGINEERING

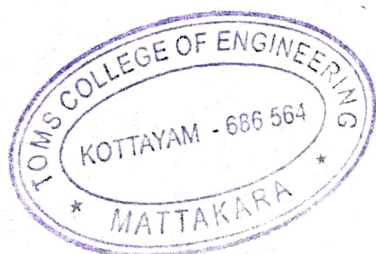
PO 1	ENGINEERING KNOWLEDGE : Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	PROBLEM ANALYSIS : Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	DESIGN/DEVELOPMENT OF SOLUTIONS : Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	CONDUCT INVESTIGATIONS OF COMPLEX PROBLEMS : research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	MODERN TOOL USAGE : Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	THE ENGINEER AND SOCIETY : Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	ENVIRONMENT AND SAINABILITY : Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	ETHICS : Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	INDIVIDUAL AND TEAM WORK : Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	COMMUNICATION : Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	PROJECT MANAGEMENT AND FINANCE : Demonstrate knowledge and understanding of the engineering and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	LIFE-LONG LEARNING : Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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CIVIL ENGINEERING

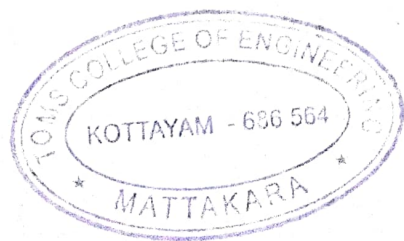
PO 1	Engineering Knowledge	Ability to apply knowledge of Mathematics, science and engineering to solve the problems related to the field of Civil engineering.
PO 2	Problem Analysis	Ability to identify, formulate, and analyze civil engineering problems using the principles of Mathematics, engineering and science.
PO 3	Design/Development of Solutions	Ability to design solutions for civil engineering problems and design components or processes to meet the desired needs within realistic constraints such as economical, environmental, social, political, health, safety and sustainability.
PO 4	Investigation	Use research based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
PO 5	Modern Tool Usage	Knowledge of application of modern tools such as different computer software, modern instrumentation for understanding the limitations of Engineering activities and also for the modelling and design of Engineering systems.
PO 6	The Engineer and Society	Ability to understand professional and ethical responsibility as well as the importance of professional licensure
PO 7	Environment and Sustainability	Ability to understand the impact of the professional Engineering solutions in societal and environmental contexts and demonstrate the need of sustainable development.
PO 8	Ethics	Ability to apply ethical principles to professional civil engineering practice.
PO 9	Individual and Team Work	Ability to function effectively as an individual and as a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks and meet objectives.
PO 10	Communication	Ability to communicate effectively to the engineering community and with the society through effective reports, documents, presentations and drawings.
PO 11	Project Management and Finance –	Ability to demonstrate the knowledge of construction management, finance, asset management, public policy and administration in managing and executing the projects.
PO 12	Life Long Learning	Ability to recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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MECHANICAL ENGINEERING

PO 1	Engineering Knowledge	Ability to apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to the solution of complex engineering problems related to mechanical engineering.
PO 2	Problem Analysis	Ability to identify, formulate, research literature and analyse complex engineering problems related to mechanical engineering reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO 3	Design/Development of Solutions	Ability to design solutions for complex engineering problems related to mechanical engineering and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO 4	Investigation	Ability to conduct investigation into complex engineering problems related to mechanical engineering using research based knowledge including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
PO 5	Modern Tool Usage	Ability to create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems related to mechanical engineering, with an understanding of the limitations.
PO 6	The Engineer and Society	Ability to apply reasoning informed by contextual knowledge to assess societal health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems related to mechanical engineering.
PO 7	Environment and Sustainability	Ability to understand and evaluate the sustainability and the impact of professional engineering work in the solution of complex engineering problems related to mechanical engineering in societal and environmental contexts.
PO 8	Ethics	Ability to apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.
PO 9	Communication	Ability to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
PO 10	Individual and Team Work	Ability to function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings.
PO 11	Project Management and Finance	Ability to demonstrate knowledge and understanding of engineering and management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life Long Learning	Ability to recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



Paul. AJ

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COMPUTER SCIENCE AND ENGINEERING

PO 1	Engineering Knowledge	Apply the knowledge of mathematics, science and engineering to the solution of complex engineering problems.
PO 2	Problem Analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and also the cultural, societal, and environmental considerations.
PO 4	Investigation	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern Tool Usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The Engineer and Society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and Sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 10	Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 11	Project Management and Finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life Long Learning	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.



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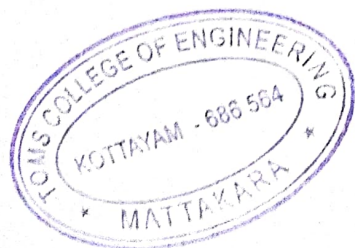
PROGRAM SPECIFIC OUTCOMES



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DIRECTOR
TOMS COLLEGE OF ENGINEERING
KOTHRICKAL - 686 004

CHEMICAL ENGINEERING

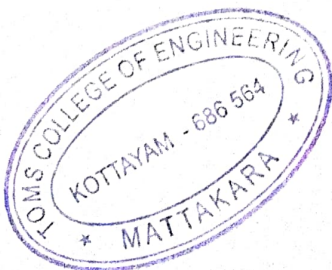
PSO 1	Evaluate and identify separation process for the system.
PSO 2	Apply the knowledge of unit operations and unit processes for design the chemical plant.
PSO 3	Evaluate the energy scenario & environment related issues in Chemical Plants



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CIVIL ENGINEERING

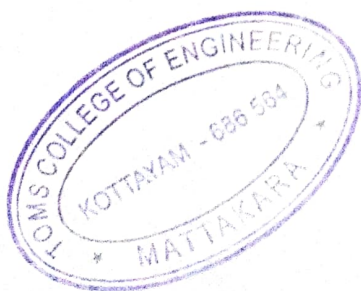
PSO 1	Ability to work as a professional by applying civil engineering principles and management practices
PSO 2	Ability to apply the concepts of civil engineering in solving the problems of society
PSO 3	Ability to pursue advanced degrees so as to improve and expand their professional skills
PSO 4	Ability to apply civil engineering techniques to predict and model simple and complex civil engineering activities



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MECHANICAL ENGINEERING

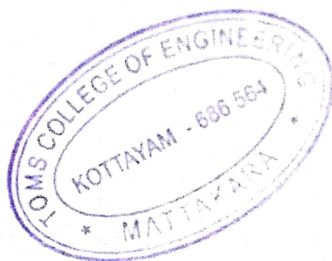
PSO 1		Ability to apply the concepts of material science and engineering, computer aided engineering, thermal engineering and manufacturing technologies for design, development, analysis and maintenance of mechanical systems and processes.
PSO 2		Capability to be employable in Thermal, Manufacturing, Design, Production industries; academic institutes, Research and development organizations at local, regional, national and global level.
PSO 3		Ability to absorb, analyse, demonstrate and maintain latest developments in mechanical engineering and allied fields
PSO 4		Ability to work as a professional and/or as an entrepreneur by applying mechanical engineering principles and management practices
PSO 5		Ability to Pursue advanced degrees in engineering, business, or other professional fields so as to improve and expand their technical and professional skills through formal means as well as through informal self-study.



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COMPUTER SCIENCE AND ENGINEERING

PSO 1	The ability to develop computer programs by applying mathematical concepts and using suitable data structures and algorithmic techniques
PSO 2	The ability to design and develop solutions using suitable programming languages by following standard software engineering principles
PSO 3	Develop system solutions involving both hardware and software modules



Pan. A.J.
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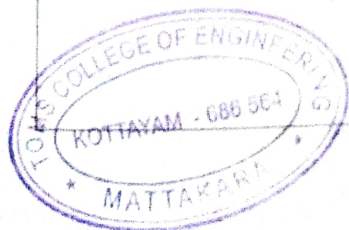
TOMS COLLEGE OF ENGINEERING

A VISVESWARAYA GROUP INSTITUTION

DEPARTMENT OF BASIC SCIENCE ENGINEERING

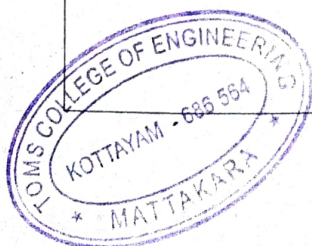
B. Tech First year first semester

COURSE OUTCOMES		
Course title with code	#	Statement
LINEAR ALGEBRA AND CALCULUS MAT 101	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 conditionally convergent
	CO 5	determine the Taylor and Fourier series expansion of functions and learn their applications.
ENGINEERING PHYSICS B PHT 110 E	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 environment
	CO 5	Apply the comprehended knowledge about laser and fibre optic communication systems in various engineering applications



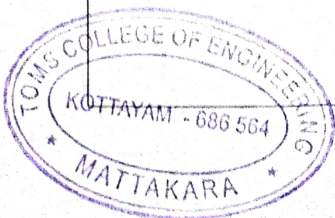
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ENGINEERING CHEMISTRY CYT 100	CO 1.	Apply the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields.
	CO 2	Understand various spectroscopic techniques like UV-Visible, IR, NMR and its applications.
	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.
ENGINEERING MECHANICS EST 100	CO 1.	Recall principles and theorems related to rigid body mechanics
	CO 2	Identify and describe the components of system of forces acting on the rigid body
	CO 3	Apply the conditions of equilibrium to various practical problems involving different force system.
	CO 4	Choose appropriate theorems, principles or formulae to solve problems of mechanics
	CO 5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
EST 110 ENGINEERING GRAPHICS	CO 1.	Draw the projection of points and lines located in different quadrants
	CO 2	Prepare multiview orthographic projections of objects by visualizing them in different positions
	CO 3	Draw sectional views and develop surfaces of a given object
	CO 4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
	CO 5	Convert 3D views to orthographic views
	CO6	Obtain multiview projections and solid models of objects using CAD tools
EST 120 BASICS OF CIVIL & MECHANICAL ENGINEERING	CO 1.	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering.
	CO 2	Explain different types of buildings, building components, building materials and building construction
	CO 3	Describe the importance, objectives and principles of



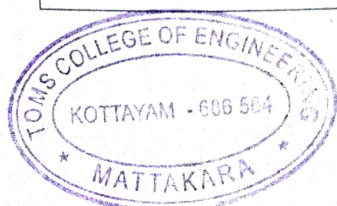
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	CO 4	surveying. Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
	CO 5	Discuss the Materials, energy systems, water management and environment for green buildings.
	CO6	Analyse thermodynamic cycles and calculate its efficiency
	CO 7	Analyse thermodynamic cycles and calculate its efficiency
	CO 8	Explain the basic principles of Refrigeration and Air Conditioning
	CO 9	Describe the working of hydraulic machines
	CO 10	Explain the working of power transmission elements
	CO 11	Describe the basic manufacturing, metal joining and machining processes
EST 13 BASICS OF ELECTRICAL & 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
	CO6	Explain the principle of radio and cellular communication
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
	CO6	Understand the basics of teamwork and leadership
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



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	CO 4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics
	CO 5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results
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
	CO6	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
ESL 120 CIVIL & MECHANICAL WORKSHOP	CO 1.	Name different devices and tools used for civil engineering measurements
	CO 2	Explain the use of various tools and devices for various field measurements
	CO 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.
	CO 4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
	CO 5	Compare different techniques and devices used in civil engineering measurements
	CO6	Identify Basic Mechanical workshop operations in accordance with the material and objects
	CO 7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
	CO 8	Apply appropriate safety measures with respect to the mechanical workshop trades
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

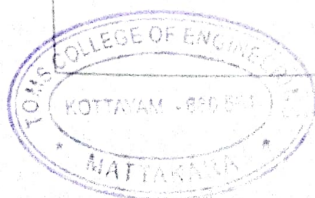


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	CO 3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
	CO 4	Identify and test various electronic components
	CO 5	Assemble and test electronic circuits on boards
	CO6	Draw circuit schematics with EDA tools
	CO 7	Work in a team with good interpersonal skills

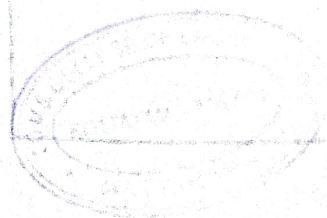
FIRST YEAR SECOND SEM

Course Title With Code	#	Statement
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
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 environment
	CO 5	Apply the comprehended knowledge about laser and fibre optic communication systems in various



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CYT 100 ENGINEERING CHEMISTRY	CO 1.	engineering applications 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.
EST 100 ENGINEERING MECHANICS	CO 1.	Recall principles and theorems related to rigid body mechanics
	CO 2	Identify and describe the components of system of forces acting on the rigid body
	CO 3	Apply the conditions of equilibrium to various practical problems involving different force system
	CO 4	Choose appropriate theorems, principles or formulae to solve problems of mechanics
	CO 5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses
EST 110 ENGINEERING GRAPHICS	CO 1.	Draw the projection of points and lines located in different quadrants
	CO 2	Prepare multiview orthographic projections of objects by visualizing them in different positions
	CO 3	Draw sectional views and develop surfaces of a given object
	CO 4	Prepare pictorial drawings using the principles of isometric and perspective projections to visualize objects in three dimensions.
	CO 5	Convert 3D views to orthographic views
	CO 6	Obtain multiview projections and solid models of objects using CAD tools
EST 120 BASICS OF CIVIL & MECHANICAL ENGINEERING	CO 1.	Recall the role of civil engineer in society and to relate the various disciplines of Civil Engineering
	CO 2	Explain different types of buildings, building components, building materials and building construction
	CO 3	Describe the importance, objectives and principles of surveying
	CO 4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
	CO 5	Discuss the Materials, energy systems, water management and environment for green buildings
	CO 6	Analyse thermodynamic cycles and calculate its efficiency
	CO 7	Illustrate the working and features of I.C Engines

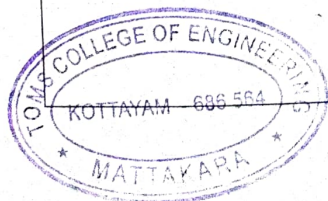


	CO 8	Explain the basic principles of Refrigeration and Air Conditioning
	CO 9	Describe the working of hydraulic machines
	CO 10	Explain the working of power transmission elements
	CO 11	Describe the basic manufacturing, metal joining and machining processes
	CO 1.	Apply fundamental concepts and circuit laws to solve simple DC electric circuits
EST 130 BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING	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
	CO 1.	Develop vocabulary and language skills relevant to engineering as a profession
HUN 102 PROFESSIONAL COMMUNICATION	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
	CO 1.	Analyze a computational problem and develop an algorithm/flowchart to find its solution
EST 102 PROGRAMMING IN C	CO 2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
	CO 3	Write readable C programs with arrays, structure or union for storing the data to be processed
	CO 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
	CO 5	Write readable C programs which use pointers for array processing and parameter passing
	CO 6	Develop readable C programs with files for reading input and storing output
	CO 1.	Develop analytical/experimental skills and impart prerequisite hands on experience for engineering laboratories
PHL 120 ENGINEERING PHYSICS LAB	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



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		results with theoretical calculations
	CO 4	Analyze the techniques and skills associated with modern scientific tools such as lasers and fiber optics
	CO 5	Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results
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 integral part of curriculum
ESL 120 CIVIL & MECHANICAL WORKSHOP	CO 1.	Name different devices and tools used for civil engineering measurements
	CO 2	Explain the use of various tools and devices for various field measurements
	CO 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.
	CO 4	Choose materials and methods required for basic civil engineering activities like field measurements, masonry work and plumbing.
	CO 5	Compare different techniques and devices used in civil engineering measurements
	CO 6	Identify Basic Mechanical workshop operations in accordance with the material and objects
	CO 7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
	CO 8	Apply appropriate safety measures with respect to the mechanical workshop trades
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



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	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



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COURSE OUTCOMES

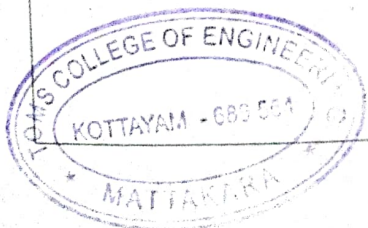
DEPARTMENT OF CIVIL ENGINEERING



Paul AJ
Director
TOMS COLLEGE OF ENGINEERING
MUSSEKUNJOOR
KUTTAYAM, KERALA - 686 584

Second year third semester civil engineering

Course code and title	#	statement
MAT201 PARTIAL DIFFERENTIAL EQUATION 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.
CET201 MECHANICS OF SOLIDS	CO 1.	Recall the fundamental terms and theorems associated with mechanics of linear elastic deformable bodies.
	CO 2	Explain the behavior and response of various structural elements under various loading conditions.
	CO 3	Apply the principles of solid mechanics to calculate internal stresses/strains, stress resultants and strain energies in structural elements subjected to axial/transverse loads and bending/twisting moments.
	CO 4	Choose appropriate principles or formula to find the elastic constants of materials making use of the information available.
	CO 5	Perform stress transformations, identify principal planes/ stresses and maximum shear stress at a point in a structural member.
	CO 6	Analyse the given structural member to calculate the safe load or proportion the cross section to carry the load safely.
CET203 FLUID MECHANICS & HYDRAULICS	CO 1.	Recall the relevant principles of hydrostatics and hydraulics of pipes and open channels
	CO 2	Identify or describe the type, characteristics or properties of fluid flow
	CO 3	Estimate the fluid pressure, perform the stability check of bodies under hydrostatic condition
	CO 4	Compute discharge through pipes or estimate the forces on pipe bends by applying hydraulic principles of continuity, energy and/or momentum



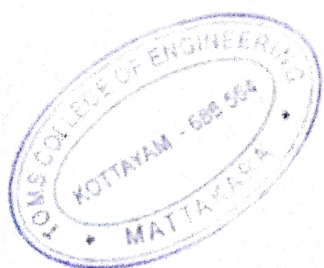
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CET205 SURVEYING & GEOMATICS	CO 5	Analyze or compute the flow through open channels, perform the design of prismatic channels
	CO 1	Apply surveying techniques and principles of leveling for the preparation of contour maps, computation of area volume and sketching mass diagram
	CO 2	Apply the principles of surveying for triangulation
	CO 3	Apply different methods of traverse surveying and traverse balancing
	CO 4	Identify the possible errors in surveying and apply the corrections in field measurements
	CO 5	Apply the basic knowledge of setting out of different types of curves
	CO 6	employ surveying techniques using advanced surveying equipments
EST200 DESIGN & ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering.
	CO 2	Apply design thinking while learning and practicing engineering.
	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
HUT200 PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.
	CO 2	Adopt a good character and follow an ethical life
	CO 3	Adopt a good character and follow an ethical life
	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues
MCN201 SUSTAINABLE ENGINEERING	CO 1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
	CO 2	Explain the different types of environmental pollution problems and their sustainable solutions
	CO 3	Discuss the environmental regulations and standards
	CO 4	Outline the concepts related to conventional and non-conventional energy
	CO 5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
CEL201 CIVIL ENGINEERING PLANNING & DRAFTING LAB	CO 1	Illustrate ability to organise civil engineering drawings systematically and professionally
	CO 2	Prepare building drawings as per the specified guidelines.
	CO 3	Assess a complete building drawing to include all necessary information



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Academic Affairs

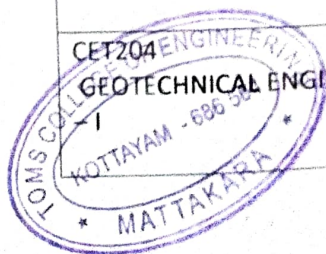
CEL203 SURVEY LAB	CO 4	Create a digital form of the building plan using any drafting software
	CO 1.	Use conventional surveying tools such as chain/tape and compass for plotting and area determination.
	CO 2	Apply levelling principles in field
	CO 3	Solve triangulation problems using theodolite
	CO 4	Employ total station for field surveying
	CO 5	Demonstrate the use of distomat and handheld GPS



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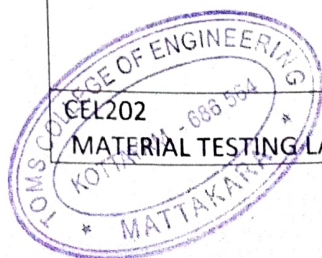
SECOND YEAR FOURTH SEMESTER

Course name and title	#	Statement
MAT202 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.
CET202 ENGINEERING GEOLOGY	CO 1.	Recall the fundamental concepts of surface processes, subsurface process, minerals, rocks, groundwater and geological factors in civil engineering constructions.
	CO 2	Identify and describe the surface processes, subsurface process, earth materials, groundwater and geological factors in civil engineering constructions
	CO 3	Apply the basic concepts of surface and subsurface processes, minerals, rocks, groundwater and geological characteristics in civil engineering constructions
	CO 4	Analyze and classify geological processes, earth materials and groundwater.
	CO 5	Evaluation of geological factors in civil engineering constructions.
CET204 GEOTECHNICAL ENGINEERING	CO 1.	Explain the fundamental concepts of basic and engineering properties of soil
	CO 2	Describe the laboratory testing methods for determining soil parameters



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	CO 3	Solve the basic properties of soil by applying functional relationships
	CO 4	Calculate the engineering properties of soil by applying the laboratory test results and the fundamental concepts of soil mechanics
	CO 5	Analyze the soil properties to identify and classify the soil
CET206 TRANSPORTATION ENGINEERING	CO 1.	Apply the basic principles of Highway planning and design highway geometric elements
	CO 2	Apply standard code specifications in judging the quality of highway materials; designing of flexible pavements
	CO 3	Explain phenomena in road traffic by collection, analysis and interpretation of traffic data through surveys; creative design of traffic control facilities
	CO 4	Understand about railway systems, tunnel, harbour and docks
	CO 5	Express basics of airport engineering and design airport elements
EST200 DESIGN & ENGINEERING	CO 1.	Explain the different concepts and principles involved in design engineering.
	CO 2	Apply design thinking while learning and practicing engineering
	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
HUT200 PROFESSIONAL ETHICS	CO 1.	Understand the core values that shape the ethical behaviour of a professional.
	CO 2	Adopt a good character and follow an ethical life
	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
MCN202 CONSTITUTION OF INDIA	CO 1.	Explain the background of the present constitution of India and features.
	CO 2	Utilize the fundamental rights and duties.
	CO 3	Understand the working of the union executive, parliament and judiciary.
	CO 4	Understand the working of the state executive, legislature and judiciary.
	CO 5	Utilize the special provisions and statutory institutions.
	CO 6	Show national and patriotic spirit as responsible citizens of the country
CEL202 MATERIAL TESTING LAB- I	CO 1.	The understand the behaviour of engineering materials under various forms and stages of loading.



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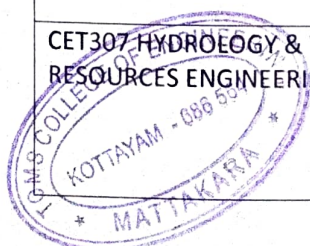
	CO 2	Characterize the elastic properties of various materials.
	CO 3	Evaluate the strength and stiffness properties of engineering materials under various loading conditions.
CEL204 FLUID MECHANICS LAB	CO 1.	Apply fundamental knowledge of Fluid Mechanics to corresponding experiments
	CO 2	Apply theoretical concepts in Fluid Mechanics to respective experiments
	CO 3	Analyse experimental data and interpret the results
	CO 4	Document the experimentation in prescribed manner



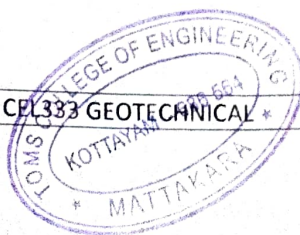
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THIRD YEAR FIFTH SEMESTER

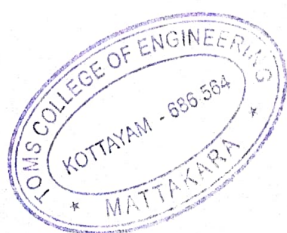
COURESE NAME AND TITLE	#	Statement
CET301 STRUCTURAL ANALYSIS – I	CO 1.	Apply the principles of solid mechanics to analyse trusses.
	CO 2	Apply various methods to determine deflections in statically determinate structures.
	CO 3	Identify the problems with static indeterminacy and tackling such problems by means of the method of consistent deformations and energy principles.
	CO 4	Apply specific methods such as slope deflection and moment distribution methods of structural analysis for typical structures with different characteristics.
	CO 5	Apply suitable methods of analysis for various types of structures including cables, suspension bridges and arches.
	CO 6	Analyse the effects of moving loads on structures using influence lines.
CET303 DESIGN OF CONCRETE STRUCTURES	CO 1.	Recall the fundamental concepts of limit state design and code provisions for design of concrete members under bending, shear, compression and torsion.
	CO 2	Analyse reinforced concrete sections to determine the ultimate capacity in bending, shear and compression
	CO 3	Design and detail beams, slab, stairs and footings using IS code provisions.
	CO 4	Design and detail columns using IS code and SP 16 design charts.
	CO 5	Explain the criteria for earthquake resistant design of structures and ductile detailing of concrete structures subjected to seismic forces.
CET305 GEOTECHNICAL ENGINEERING – II	CO 1.	Understand soil exploration methods
	CO 2	Explain the basic concepts, theories and methods of analysis in foundation engineering
	CO 3	Calculate bearing capacity, pile capacity, foundation settlement and earth pressure
	CO 4	Analyze shallow and deep foundations
	CO 5	Solve the field problems related to geotechnical engineering
CET307 HYDROLOGY & WATER RESOURCES ENGINEERING	CO 1.	Describe and estimate the different components of hydrologic cycle by processing hydrometeorological data
	CO 2	Determine the crop water requirements for the design of irrigation canals by collecting the



		principles of irrigation engineering
	CO 3	Perform the estimation of streamflow and/or describe the river behavior and control structures
	CO 4	Describe and apply the principles of reservoir engineering to estimate the capacity of reservoirs and their useful life
	CO 5	Demonstrate the principles of groundwater engineering and apply them for computing the yield of aquifers and wells
CET309 CONSTRUCTION TECHNOLOGY & MANAGEMENT	CO 1.	Describe the properties of materials used in construction
	CO 2	Explain the properties of concrete and its determination
	CO 3	Describe the various elements of building construction
	CO 4	Explain the technologies for construction
	CO 5	Describe the procedure for planning and executing public works
	CO 6	Apply scheduling techniques in project planning and control
MCN301 DISASTER MANAGEMENT	CO 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)
	CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand).
	CO 3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand)
	CO 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)
	CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand).
	CO 6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand).
CEL331 MATERIAL TESTING LAB – II	CO 1.	To describe the basic properties of various construction materials
	CO 2	Characterize the physical and mechanical properties of various construction materials.
	CO 3	Interpret the quality of various construction materials as per IS Codal provisions.
CEL333 GEOTECHNICAL	CO 1.	Identify and classify soil based on standard



ENGINEERING LAB		geotechnical experimental methods.
	CO 2	Perform and analyze permeability tests.
	CO 3	Interpret engineering behavior of soils based on test results.
	CO 4	Perform laboratory compaction, CBR and in-place density test for fill quality control in the field
	CO 5	Evaluate the strength of soil by performing various tests viz. direct shear test, unconfined compressive strength test and triaxial shear test.
	CO 6	Evaluate settlement characteristics of soils.

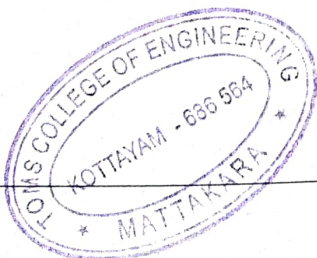


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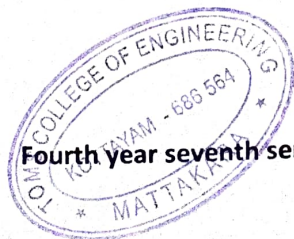
THIRD YEAR SIXTH SEMESTER

Course name and title	#	Statement
CET302 STRUCTURAL ANALYSIS – II	CO 1	Understand the principles of plastic theory and its applications in structural analysis.
	CO 2	Examine the type of structure and decide on the method of analysis.
	CO 3	Apply approximate methods of analysis for framed structures to ascertain stress resultants approximately but quickly.
	CO 4	Apply the force method to analyse framed structures.
	CO 5	Apply the displacement methods to analyse framed structures.
	CO 6	Remember basic dynamics, understand the basic principles of structural dynamics and apply the same to simple structures.
CET304 ENVIRONMENTAL ENGINEERING	CO 1	To appreciate the role of environmental engineering in improving the quality of environment
	CO 2	To plan for collection and conveyance of water and waste water
	CO 3	To enhance natural water purification processes in an engineered environment
	CO 4	To decide on appropriate technology for water and waste water treatment
CET306 DESIGN OF HYDRAULIC STRUCTURES	CO 1	Elucidate the causes of failure, principles of design of different components of hydraulic structures
	CO 2	Describe the features of canal structures and perform the design of alluvial canals
	CO 3	Perform the hydraulic design of minor irrigation structures such as cross drainage works, canal falls, cross regulator
	CO 4	Prepare the scaled drawings of different minor irrigation structures
	CO 5	Describe the design principles and features of dams and perform the stability analysis of gravity dams
CET352 ADVANCED CONCRETE TECHNOLOGY	CO 1	To recall the properties and testing procedure of concrete materials as per IS code
	CO 2	To describe the procedure of determining the properties of fresh and hardened concrete
	CO 3	To design concrete mix using IS Code Methods.
	CO 4	To explain non destructive testing of concrete
	CO 5	To describe the various special types of concretes



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HUT300 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. (Cognitive knowledge level: Understand)
	CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
	CO 3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)
	CO 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)
	CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)
CET308 COMPREHENSIVE COURSE WORK	CO 1	Learn to prepare for a competitive examination
	CO 2	Comprehend the questions in Civil Engineering field and answer them with confidence
	CO 3	Communicate effectively with faculty in scholarly environments
	CO 4	Analyze the comprehensive knowledge gained in basic courses in the field of Civil Engineering
CEL332 TRANSPORTATION ENGINEERING LAB	CO 1	Analyse the suitability of soil as a pavement subgrade material
	CO 2	Assess the suitability of aggregates as a pavement construction material
	CO 3	Characterize bitumen based on its properties so as to recommend it as a pavement construction material.
	CO 4	Design bituminous mixes for pavement layers
	CO 5	Assess functional adequacy of pavements based on roughness of pavement surface
CEL334 CIVIL ENGINEERING SOFTWARE LAB	CO 1	To undertake analysis and design of multi-storeyed framed structure, schedule a given set of project activities using a software
	CO 2	To prepare design details of different structural components, implementation plan for a project.
	CO 3	To prepare a technical document on engineering activities like surveying, structural design and project planning.

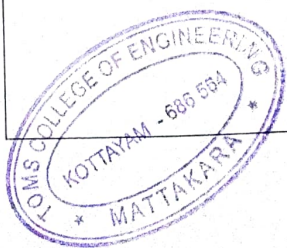


Fourth year seventh semester

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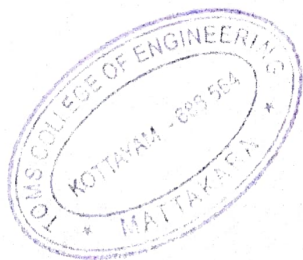
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Course name and title	#	statement
CET401 DESIGN OF STEEL STRUCTURES	CO 1	Explain the behavior and properties of structural steel members to resist various structural forces and actions and apply the relevant codes of practice
	CO 2	Analyses the behavior of structural steel members and undertake design at both serviceability and ultimate limit states
	CO 3	Explain the theoretical and practical aspects of Design of composite Steel Structure along with the planning and design aspects
	CO 4	Apply a diverse knowledge of Design of Steel engineering practices applied to real life problems
	CO 5	Demonstrate experience in the implementation of design of structures on engineering concepts which are applied in field Structural Engineering
CET423 GROUND IMPROVEMENT TECHNIQUES	CO 1	Classify different ground improvement methods based on the soil suitability
	CO 2	Outline the basic concept/ design aspects of various ground improvement methods
	CO 3	Identify the construction procedure of different ground improvement methods
	CO 4	Choose different application of geosynthetics and soil stabilisation in Ground improvement
MET445 RENEWABLE ENERGY ENGINEERING	CO 1	Explain renewable energy sources and evaluate the implication of renewable energy. To predict solar radiation at a location
	CO 2	Explain solar energy collectors, storages, solar cell characteristics and applications
	CO 3	Explain the different types of wind power machines and control strategies of wind turbines
	CO 4	Explain the ocean energy and conversion devices and different Geothermal sources
	CO 5	Explain biomass energy conversion devices. Calculate the Net Present value and payback period
MCN401 INDUSTRIAL SAFETY ENGINEERING	CO 1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)
	CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand)
	CO 3	Explain different issues in construction industries. (Cognitive Knowledge level: Understand)
	CO 4	Describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand)



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CEL411 ENVIRONMENTAL ENGG LAB		Understand)
	CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)
	CO 1	Analyse various physico-chemical and biological parameters of water
CEQ413 SEMINAR	CO 2	Compare the quality of water with drinking water standards and recommend its suitability for drinking purposes
	CO 1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).
	CO 2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
	CO 3	Prepare a presentation about an academic document (Cognitive knowledge level: Create)
	CO 4	Give a presentation about an academic document (Cognitive knowledge level: Apply).
ED415 PROJECT PHASE I	CO 5	Prepare a technical report (Cognitive knowledge level: Create).
	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply)
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply)
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply)
	CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO 5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze)
	CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).

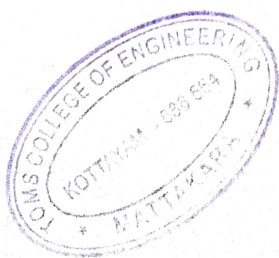


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FOURTH YEAR EIGHTH SEMESTER

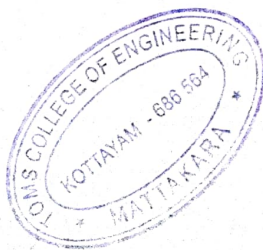
Course Title And Code	#	Statement
CET402 QUANTITY SURVEYING & VALUATION	CO 1	Define basic terms related to estimation, quantity surveying and contract document
	CO 2	Interpret the item of work from drawings and explain its general specification and unit of measurement.
	CO 3	Make use of given data from CPWD DAR/DSR for calculating the unit rate of different items of work associated with building construction
	CO 4	Develop detailed measurement (including BBS) and BoQ of a various work like buildings, earthwork for road, sanitary and water supply work
	CO 5	Explain various basic terms related to valuation of land and building
	CO 6	Develop valuation of buildings using different methods of valuation.
CED416 PROJECT PHASE II	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply)
	CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO 5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
	CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).



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COURSE OUTCOMES

DEPARTMENT OF CHEMICAL ENGINEERING

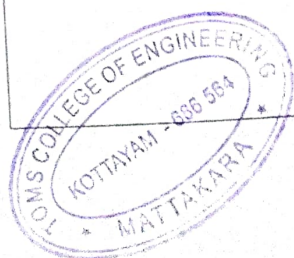


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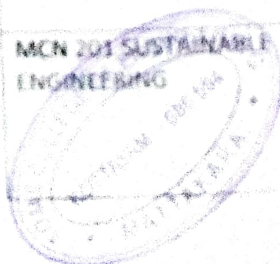
SECOND YEAR THIRD SEMESTER

COURSE TITLE AND CODE	#	STATEMENT
MAT 201 PARTIAL DIFFERENTIAL EQUATION 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
CHT 201 CHEMISTRY FOR PROCESS ENGINEERING	CO 1	Describe the principles, instrumentation and applications of advanced electrochemical analytical tools.
	CO 2	Explain the working principles, instrumentation and applications of atomic and molecular spectroscopic techniques and Electron microscopy.
	CO 3	Illustrate distribution law and apply the knowledge in solvent extraction and describe the kinetics of different chemical processes
	CO 4	Interpret different adsorption isotherms and familiarize colloids, emulsion and surfactants.
	CO 5	Explain the basic concepts of nuclear chemistry and photochemical process and solve decay kinetic problems.
CHT 203 CHEMICAL PROCESS PRINCIPLES	CO 1	Distinguish and summarize various unit operations & unit processes.
	CO 2	Translate physical quantities and empirical equations from one set of units to another quickly and accurately. CO3 Estimate chemical com



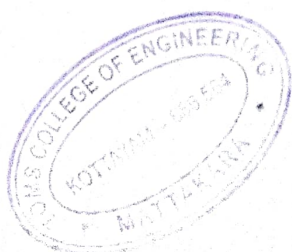
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	CO 3	Estimate chemical composition and other physical quantities such as density, flow rate, pressure and temperature
	CO 4	Apply ideal and real gas equations of state to establish fundamental properties of fluids
	CO 5	Define various terminologies related to humidification and utilize the humidity chart to determine the properties of air-water vapour system
	CO 6	Develop and solve basic material & energy balance equations for the unit operations and unit processes employed in process industries.
CHT 205 FLUID AND PARTICLE MECHANICS	CO 1	Apply the basic properties and transport laws to fluid in different conditions like statics and dynamics
	CO 2	Apply the fluid flow principles in the application of the mass, momentum and energy equations
	CO 3	Design a piping network using the concept of fluid dynamics
	CO 4	Design a fluidized bed and a packed bed using the concept of fluid dynamics considering its application.
	CO 5	Select valves, pumps and flow measuring devices in process industries with the knowledge of the basic principles.
EST 200 DESIGN & ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering.
	CO 2	Apply design thinking while learning and practicing engineering
	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
HUT 200 PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.
	CO 2	Adopt a good character and follow an ethical life
	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
MCN 201 SUSTAINABLE ENGINEERING	CO 1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
	CO 2	Explain the different types of environmental pollution problems and their sustainable



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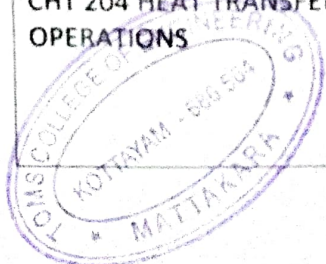
		solutions
	CO 3	Discuss the environmental regulations and standards
	CO 4	Outline the concepts related to conventional and non-conventional energy
	CO 5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
CHL 201 CHEMICAL TECHNOLOGY & ENVIRONMENTAL ENGINEERING LAB	CO 1	Analyse and estimate parameters for the selected chemicals.
	CO 2	Develop skills to use analytical and instrumental methods for measurement of parameters relevant to chemical engineering.
	CO 3	Develop skills of accuracy in experimentation, interpret the experimental result and suggest its area of application.
	CO 4	Demonstrate capacity to work in team and exhibit knowledge of safety, health and environment by practicing laboratory ethics
CHL 203 CHEMISTRY LAB FOR PROCESS ENGINEERING	CO 1	Explain the thermodynamics of solutes in a solvent and apply this knowledge in higher semester practical sessions.
	CO 2	Describe the mutual solubilities of liquids and apply this idea in solvent extraction
	CO 3	Construct a phase diagram of bi and tri component systems and predict the composition of mixtures at various temperature
	CO 4	Evaluate the capacity of coagulating electrolytes and synthesize colloidal solutions and
	CO 5	Investigate adsorption isotherms and apply this knowledge in various industrial processes
	CO6	Quantify the analyte using electrochemical analytical techniques such as conductometry and potentiometry



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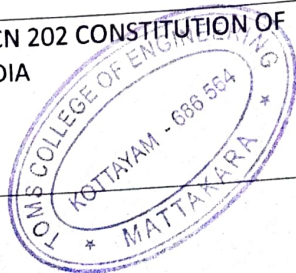
SECOND YEAR FOURTH SEMESTER

COURSE TITLE AND CODE	#	STATEMENT
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
CHT 202 CHEMICAL ENGINEERING THERMODYNAMICS	CO 1	Apply the laws of thermodynamics to analyse various processes
	CO 2	Define thermodynamic properties and processes of a system
	CO 3	Relate various thermodynamic properties to easily measurable properties
	CO 4	Calculate the change in properties when given substances are mixed under specified conditions
	CO 5	Construct phase diagrams and Explain VLE of completely miscible, partially miscible and immiscible liquids
	CO 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
CHT 204 HEAT TRANSFER OPERATIONS	CO 1	Identify and distinguish various modes of heat transfer and examine the mechanisms involved
	CO 2	Apply appropriate governing equations and analyse conduction heat transfer problems for different geometries under steady state and



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		transient processes
	CO 3	Solve forced and natural convection heat transfer problems using empirical equations
	CO 4	Explain the concepts behind radiation heat transfer and solve radiation heat transfer problems
	CO 5	Explain the concepts behind radiation heat transfer and solve radiation heat transfer problems
	CO6	Design of heat exchangers and evaporators after interpreting the basic concepts
CHT 206 PARTICLE TECHNOLOGY	CO 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
	CO 2	Identify the principles of free settling, hindered settling and mineral beneficiation techniques
	CO 3	Apply the concepts of filtration theory and select appropriate filtration equipment
	CO 4	Describe separation techniques for particulates in air
	CO 5	Select suitable size reduction equipment and estimate the energy requirements for a specified reduction in size for a given material.
	CO6	Demonstrate mixing and conveying processes in chemical industries
EST 200 DESIGN & ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering.
	CO 2	Apply design thinking while learning and practicing engineering
	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
HUT 200 PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.
	CO 2	Adopt a good character and follow an ethical life
	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics
	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
MCN 202 CONSTITUTION OF INDIA	CO 1	Explain the background of the present constitution of India and features.
	CO 2	Utilize the fundamental rights and duties.
	CO 3	Understand the working of the union executive, parliament and judiciary.



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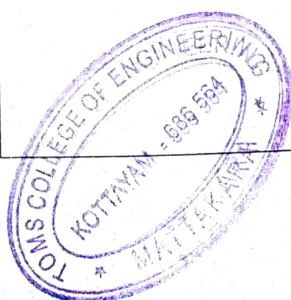
	CO 4	Understand the working of the state executive, legislature and judiciary
	CO 5	Utilize the special provisions and statutory institutions.
	CO6	Show national and patriotic spirit as responsible citizens of the country
CHL 202 FLUID AND PARTICLE MECHANICS LAB	CO 1	Plan and perform experiments in flow measuring equipments and analyse the principles involved
	CO 2	Plan and perform experiments in fluid moving machinery and analyse the principles involved
	CO 3	Plan and perform experiments in solid-fluid systems and analyse the principles involved.
	CO 4	Demonstrate capacity to work in teams and exhibit knowledge of safety, health and environment by practicing laboratory ethics.
CHL 204 PARTICLE TECHNOLOGY LAB	CO 1	Use the basic principles of Particle technology to find solutions of problems by conducting experiments in the laboratory.
	CO 2	Design experiments and analyze/interpret data collected from experimental investigation in the laboratory
	CO 3	Use modern computing tools necessary for analysis of the experimental data in the laboratory.
	CO 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
	CO 5	Practice work in diverse groups and perform laboratory experiments
	CO6	Prepare cogent reports of the experimental works conducted in laboratory



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THIRD YEAR FIFTH SEMESTER

COURSE TITLE AND CODE	#	STATEMENT
CHT 301 MASS TRANSFER OPERATIONS-I	CO 1	Analyse fundamentals of mass transfer operations and estimate diffusion coefficients
	CO 2	Summarize interface mass transfer and concepts of mass transfer coefficients
	CO 3	Differentiate among different types of equipments for mass transfer operations
	CO 4	Analyse and design tray and packed columns of gas liquid contacting equipments
	CO 5	Analyse and design humidification and adsorption systems
	CO6	Analyse and design drying and crystallization systems.
CHT 303 ENVIRONMENTAL ENGINEERING	CO 1	Explain the environmental legislation and regulation aimed at protecting the environment from harmful actions.
	CO 2	Explain the different types of treatment processes for drinking water, municipal water, boiler feed water and saline water.
	CO 3	Interpret primary, secondary and tertiary treatment methods used for wastewater treatment.
	CO 4	Compare aerobic and anaerobic wastewater treatment methods.
	CO 5	Select suitable methods for treatment and disposal of sludge, industrial and hazardous waste.
	CO6	Identify the sources of air and noise pollution and select suitable control methods
CHT 305 CHEMICAL REACTION ENGINEERING	CO 1	Explain the principles of chemical kinetics and determine chemical kinetic parameters using batch reactor data.
	CO 2	Design of chemical reactors under ideal conditions.
	CO 3	Design of single and multiple reactions in ideal reactors.
	CO 4	Design chemical reactors for non-isothermal operations.
	CO 5	Design chemical reactors for non-ideal conditions.
CHT 307 INSTRUMENTATION AND PROCESS CONTROL	CO 1	Categorize measuring instruments for industrial applications and illustrate instrumentation for temperature, pressure, flow, level, composition and pH.
	CO 2	Apply Laplace transforms to solve linear differential equations and to obtain the transfer function related to first order systems.
	CO 3	Develop the response of linear open loop second



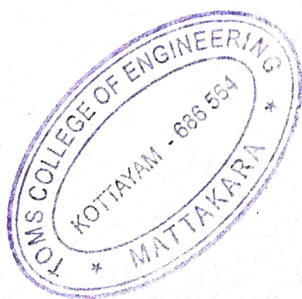
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		order systems and systems in series for various forcing functions.
	CO 4	Describe various types of controllers and analyse servo and regulatory problems of closed loop systems by using transient response.
	CO 5	Analyze the stability of linear systems by using analytical and graphical methods. Design controllers.
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. (Cognitive knowledge level: Understand)
	CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
	CO 3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)
	CO 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)
	CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)
HUT 310 MANAGEMENT FOR ENGINEERS	CO 1	Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).
	CO 2	Describe the functions of management (Cognitive Knowledge level: Understand).
	CO 3	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand).
	CO 4	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply).
	CO 5	Summarize the functional areas of management (Cognitive Knowledge level: Understand).
	CO6	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).
MCN 301 DISASTER MANAGEMENT	CO 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).
	CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand).
	CO 3	Identify the components and describe the process



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		of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand).
	CO 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)
	CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand).
	CO6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand).
CHL 331 HEAT TRANSFER OPERATIONS LAB	CO 1	Experiment with various modes of heat transfer
	CO 2	Evaluation the heat transfer coefficients
	CO 3	Determine the rate of heat transfer in various modes of heat transfer
	CO 4	Analyse the working of heat transfer equipments
	CO 5	Interpret and present the experimental data meaningfully
	CO6	Develop teamwork skills.
CHL 333 PROCESS CONTROL LAB	CO 1	Sketch and use the calibration graphs of temperature and pressure measuring instruments
	CO 2	Test the dynamics of first order systems like temperature, level and mixing processes
	CO 3	Test the dynamics of second order systems such as thermometer with thermowell, tanks in series and U-tube manometer
	CO 4	Test the characteristics of pneumatic control valves
	CO 5	Experiment on the control of temperature, flow and level processes
	CO6	Experiment on controller tuning

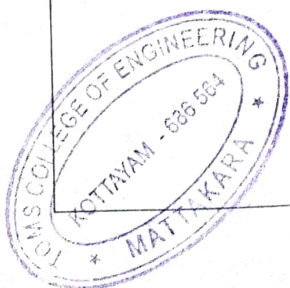


THIRD YEAR SIXTH SEMESTER

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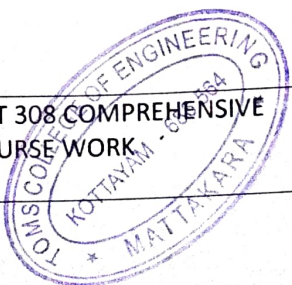
COURSE TITLE AND CODE	#	STATEMENT
CHT 302 MASS TRANSFER OPERATIONS-II	CO 1	Explain boiling point diagrams, relative volatility and differentiate various types of distillation techniques.
	CO 2	Design a fractionation column using McCabe – Thiele method and apply it for various reflux conditions
	CO 3	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.
	CO 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.
	CO 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.
	CO6	Differentiate among various types of membrane separation processes
CHT 304 TRANSPORT PHENOMENA	CO 1	Explain the mechanisms of momentum, heat and mass transfer
	CO 2	Predict the transport coefficients of gases from basic physical variables
	CO 3	Solve industrial problems involving isothermal steady state momentum transfer in simple geometries using shell momentum balance , equations of change and boundary conditions
	CO 4	Obtain analytical solutions of selected simple engineering steady state problems of heat transfer using shell energy balance and equations of change
	CO 5	Analyze simple steady state diffusion problems using shell mass balance
CHT 306 CHEMICAL TECHNOLOGY	CO 1	Sketch and explain the process flow diagram for the manufacture of inorganic chemicals.
	CO 2	Explain and draw the process flow diagram of various processes for the production Chlor-alkali and fertiliser industries.
	CO 3	Draw and explain the process flow diagram for production of carbon chemicals, surface coatings and cement.
	CO 4	Sketch and explain the process flow diagram for the manufacture of glass, pesticides and natural products like soap, pulp and paper etc.
	CO 5	Explain the food processing, production of alcohol and pharmaceuticals
	CO6	Explain various process engineering technologies and process flow sheeting methods and select the



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PROGRAM ELECTIVE I CHT312 BIOCHEMICAL ENGINEERING		best process for a product among the alternative methods available in the process industry.
	CO 1	Describe different types of cells, classification of kingdom Protista and potential of chemicals of life
	CO 2	Interpret kinetics of enzyme catalyzed reactions
	CO 3	Describe Immobilized enzyme technology. Apply basic knowledge of energy and material balances for understanding the metabolic pathways within the cell
	CO 4	Apply heat and mass transfer principles in bioreactors and bioprocess
	CO 5	Describe design and operation of a fermentation process and use of sensors
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. (Cognitive knowledge level: Understand)
	CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
	CO 3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)
	CO 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)
	CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)
HUT 310 MANAGEMENT FOR ENGINEERS	CO 1	Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).
	CO 2	Describe the functions of management (Cognitive Knowledge level: Understand)
	CO 3	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand).
	CO 4	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply).
	CO 5	Summarize the functional areas of management (Cognitive Knowledge level: Understand)
	CO 6	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).
CHT 308 COMPREHENSIVE COURSE WORK	CO 1	Learn to prepare for a competitive examination
	CO 2	Comprehend the questions in Chemical Engineering field and answer them with



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		confidence.
	CO 3	Communicate effectively with faculty in scholarly environments
	CO 4	Analyze the comprehensive knowledge gained in basic courses in the field of Chemical Engineering
CHL 332 MASS TRANSFER OPERATIONS LAB	CO 1	Apply the fundamental knowledge of mass transfer in related practical problems
	CO 2	Analyse different mass transfer operations
	CO 3	Experiment with various mass transfer equipments
	CO 4	Examine separation processes such as simple distillation, steam distillation etc. to estimate the composition in products
	CO 5	Plan and conduct the experiments and present the experimental data meaningfully
	CO6	Develop teamwork skills
CHL 334 CHEMICAL REACTION ENGINEERING LAB	CO 1	Deduce kinetic equation of homogenous chemical reactions and analyse the factors effecting the reactions
	CO 2	Analyse the effect of temperature in chemical equation and validation of Arrhenius law.
	CO 3	Determine the kinetics of reaction in ideal reactors- Batch Reactor, PFR and MFR
	CO 4	Analyse the principle, working, selection of Chemical Reactors and arriving at designing ideal reactors.
	CO 5	Account for non ideality in chemical reactors by calculating residence time distribution
	CO6	Interpret and present the experimental data meaningfully and develop teamwork skills.

FOURTH SEMESTER SEVENTH SEMESTER



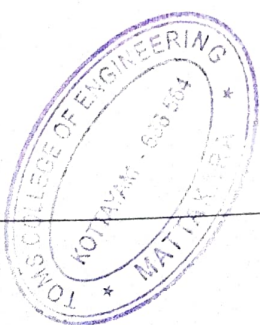
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COURSE TITLE AND CODE	#	STATEMENT
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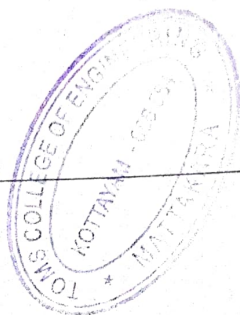
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CHT 401 CHEMICAL PROCESS EQUIPMENT DESIGN I	CO 1	Develop the thermal design of double pipe exchangers for a given heat exchange operation between single-component fluids
	CO 2	Develop the thermal design of shell and tube exchangers for a given heat exchange operation between single-component fluids
	CO 3	Design tubular condensers for condensation of single-component fluids
	CO 4	Develop the process design of evaporators for a given feed solution and terminal conditions
	CO 5	Design mechanical draft cooling tower for a given tower fill
PROGRAM ELECTIVE II FOOD PROCESSING AND TECHNOLOGY	CO 1	Explain the importance of food quality, nutritive aspects, food additives and standards
	CO 2	Discuss the food processing and packing methods
	CO 3	Select suitable food preservation techniques
	CO 4	Explain the production and utilization of food products from dairy, meat, poultry and fish industries
	CO 5	Describe treatment and disposal of food processing wastes
RENEWABLE ENERGY ENGINEERING	CO 1	Explain renewable energy sources and evaluate the implication of renewable energy. To predict solar radiation at a location
	CO 2	Explain solar energy collectors, storages, solar cell characteristics and applications
	CO 3	Explain the different types of wind power machines and control strategies of wind turbines
	CO 4	Explain the ocean energy and conversion devices and different Geothermal sources
	CO 5	Explain biomass energy conversion devices. Calculate the Net Present value and payback period
MCN 401 INDUSTRIAL SAFETY ENGINEERING	CO 1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)
	CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand)
	CO 3	Explain different issues in construction industries. (Cognitive Knowledge level: Understand)
	CO 4	Describe various hazards associated with



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CHL 411 PROCESS SIMULATION LAB		different machines and mechanical material handling. (Cognitive Knowledge level: Understand)
	CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)
	CO 1	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.
	CO 2	To solve and analyse various forms of equations of state and plot the result using process simulators
	CO 3	To solve and analyse various problems on vapour-liquid and reaction equilibria and plot the result using process simulators
	CO 4	To simulate and analyse various types of unit operations and unit processes there by simulating an entire plant using process simulators.
CHQ 413 SEMINAR	CO 5	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.
	CO 1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).
	CO 2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
	CO 3	Prepare a presentation about an academic document (Cognitive knowledge level: Create).
	CO 4	Give a presentation about an academic document (Cognitive knowledge level: Apply).
CHD 415 PROJECT PHASE I	CO 5	Prepare a technical report (Cognitive knowledge level: Create).
	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
	CO 4	Plan and execute tasks utilizing available



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		resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO 5	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)

FOURTH YEAR EIGHT SEMESTER

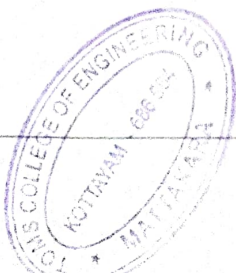
COURSE TITLE AND CODE	#	STATEMENT
CHT 402 CHEMICAL PROCESS EQUIPMENT DESIGN II	CO 1	Design binary tray distillation column
	CO 2	Design packed bed absorption column
	CO 3	Design sieve tray extraction column
	CO 4	Design direct heat rotary dryer
	CO 5	Design thin-walled unfired pressure vessels using Indian Standard codes
PROGRAM ELECTIVE III PETROLEUM REFINERY ENGINEERING	CO 1	Apply the basic principles of chemical engineering in the storage, selection and evaluation of crude oil to optimize the refinery operation.
	CO 2	Apply the basic principles of distillation in the



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		atmospheric and vacuum distillation unit and analyze the preliminary refinery operation.
	CO 3	Analyze thermal and catalytic conversion process as a part of the secondary conversion process
	CO 4	Select various techniques to improve the quality of gasoline to meet the Bharath stage norms and treatment techniques to other petroleum products.
	CO 5	Identify various test methods to the petroleum products to meet the specification and understand the properties and uses of petroleum products.
PROGRAM ELECTIVE IV CERAMIC TECHNOLOGY	CO 1	Develop an understanding about ceramics, pottery and glassware.
	CO 2	Create a perspective about glasses and its manufacture.
	CO 3	Analyse refractories and its manufacture
	CO 4	Gain knowledge about electro ceramics and its manufacture.
	CO 5	Develop mastery in bio ceramics and its manufacture.
PROGRAM ELECTIVE V SOLID WASTE MANAGEMENT	CO 1	Explain municipal solid waste management systems with respect to its physical, chemical and biological properties.
	CO 2	Select appropriate methods for solid waste collection and optimize the route for transportation.
	CO 3	Understand the design and operation of landfills.
	CO 4	Compare disposal methods of MSW by applying specific criteria.
	CO 5	Understand the recovery and recycling methods of waste management
CHD 416 PROJECT PHASE II	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply)
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
	CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO 5	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).
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COURSE OUTCOMES

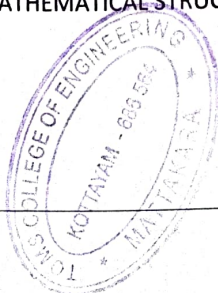
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DEPARTMENT OF COMPUTER SCIENCE

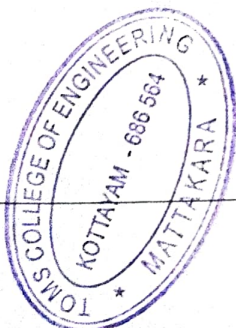
SECOND YEAR THIRD SEMESTER

COURSE NAME AND CODE	#	STATEMENT
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 (Cognitive Knowledge Level: Apply)
	CO 2	Solve counting problems by applying the elementary counting techniques - Rule of Sum, Rule of Product, Permutation, Combination,



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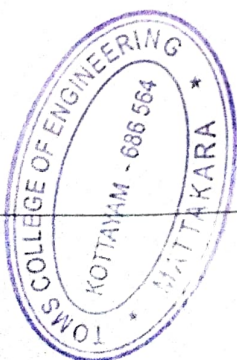
		Binomial Theorem, Pigeonhole Principle and Principle of Inclusion and Exclusion (Cognitive Knowledge Level: Apply)
	CO 3	Classify binary relations into various types and illustrate an application for each type of binary relation, in Computer Science (Cognitive Knowledge Level: Understand)
	CO 4	Illustrate an application for Partially Ordered Sets and Complete Lattices, in Computer Science (Cognitive Knowledge Level: Apply)
	CO 5	Explain Generating Functions and solve First Order and Second Order Linear Recurrence Relations with Constant Coefficients (Cognitive Knowledge Level: Apply)
	CO6	Illustrate the abstract algebraic systems - Semigroups, Monoids, Groups, Homomorphism and Isomorphism of Monoids and Groups (Cognitive Knowledge Level: Understand)
CST 201 DATA STRUCTURES	CO 1	Design an algorithm for a computational task and calculate the time/space complexities of that algorithm (Cognitive Knowledge Level: Apply)
	CO 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 (Cognitive Knowledge Level: Apply)
	CO 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 (Cognitive Knowledge Level: Apply)
	CO 4	Store a given dataset using an appropriate Hash Function to enable efficient access of data in the given set (Cognitive Knowledge Level: Apply)
	CO 5	Select appropriate sorting algorithms to be used in specific circumstances (Cognitive Knowledge Level: Analyze)
	CO6	Design and implement Data Structures for solving real world problems efficiently (Cognitive Knowledge Level: Apply)
CST 203 LOGIC SYSTEM DESIGN	CO 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 (Cognitive Knowledge level: Understand)



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	CO 2	Simplify a given Boolean Function and design a combinational circuit to implement the simplified function using Digital Logic Gates (Cognitive Knowledge level: Apply)
	CO 3	Design combinational circuits - Adders, Code Convertors, Decoders, Magnitude Comparators, Parity Generator/Checker and design the Programmable Logic Devices - ROM and PLA. (Cognitive Knowledge level: Apply)
	CO 4	Design sequential circuits - Registers, Counters and Shift Registers. (Cognitive Knowledge level: Apply)
	CO 5	Use algorithms to perform addition and subtraction on binary, BCD and floating point numbers (Cognitive Knowledge level: Understand)
CST 205 OBJECT ORIENTED PROGRAMMING USING JAVA	CO 1	Write Java programs using the object oriented concepts - classes, objects, constructors, data hiding, inheritance and polymorphism (Cognitive Knowledge Level: Apply)
	CO 2	Utilise datatypes, operators, control statements, built in packages & interfaces, Input/ Output Streams and Files in Java to develop programs (Cognitive Knowledge Level: Apply)
	CO 3	Illustrate how robust programs can be written in Java using exception handling mechanism (Cognitive Knowledge Level: Understand)
	CO 4	Write application programs in Java using multithreading and database connectivity (Cognitive Knowledge Level: Apply)
	CO 5	Write Graphical User Interface based application programs by utilising event handling features and Swing in Java (Cognitive Knowledge Level: Apply)
EST 200 DESIGN & ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering.
	CO 2	Apply design thinking while learning and practicing engineering.
	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
HUT 200 PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.
	CO 2	Adopt a good character and follow an ethical life.
	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
	CO 4	Solve moral and ethical problems through exploration and assessment by established



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MCN 201 SUSTAINABLE ENGINEERING		experiments.
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
	CO 1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
	CO 2	Explain the different types of environmental pollution problems and their sustainable solutions
	CO 3	Discuss the environmental regulations and standards
	CO 4	Outline the concepts related to conventional and non-conventional energy
CSL 201 DATA STRUCTURES LAB	CO 5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
	CO 1	Write a time/space efficient program using arrays/linked lists/trees/graphs to provide necessary functionalities meeting a given set of user requirements (Cognitive Knowledge Level: Analyse)
	CO 2	Write a time/space efficient program to sort a list of records based on a given key in the record (Cognitive Knowledge Level: Apply)
	CO 3	Examine a given Data Structure to determine its space complexity and time complexities of operations on it (Cognitive Knowledge Level: Apply)
	CO 4	Design and implement an efficient data structure to represent given data (Cognitive Knowledge Level: Apply)
	CO 5	Write a time/space efficient program to convert an arithmetic expression from one notation to another (Cognitive Knowledge Level: Apply)
CSL 203 OBJECT ORIENTED PROGRAMMING LAB (IN JAVA)	CO6	Write a program using linked lists to simulate Memory Allocation and Garbage Collection (Cognitive Knowledge Level: Apply)
	CO 1	Implement the Object Oriented concepts - constructors, inheritance, method overloading & overriding and polymorphism in Java (Cognitive Knowledge Level: Apply)
	CO 2	Implement programs in Java which use datatypes, operators, control statements, built in packages & interfaces, Input/Output streams and Files (Cognitive Knowledge Level: Apply)
	CO 3	Implement robust application programs in Java using exception handling (Cognitive Knowledge Level: Apply)

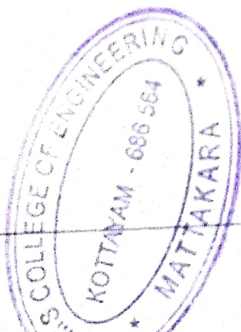


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	CO 4	Implement application programs in Java using multithreading and database connectivity (Cognitive Knowledge Level: Apply)
	CO 5	Implement Graphical User Interface based application programs by utilizing event handling features and Swing in Java (Cognitive Knowledge Level: Apply)

SECOND YEAR FOURTH SEMESTER

COURSE NAME AND CODE	#	STATEMENT
MAT 206 GRAPH THEORY	CO 1	Explain vertices and their properties, types of paths, classification of graphs and trees & their properties. (Cognitive Knowledge Level: Understand)
	CO 2	Demonstrate the fundamental theorems on Eulerian and Hamiltonian graphs. (Cognitive Knowledge Level: Understand)



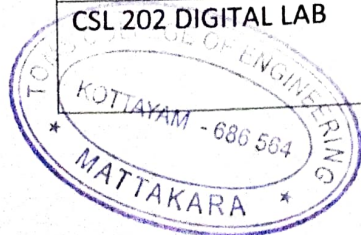
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	CO 3	Illustrate the working of Prim's and Kruskal's algorithms for finding minimum cost spanning tree and Dijkstra's and Floyd-Warshall algorithms for finding shortest paths. (Cognitive Knowledge Level: Apply)
	CO 4	Explain planar graphs, their properties and an application for planar graphs. (Cognitive Knowledge Level: Apply)
	CO 5	Illustrate how one can represent a graph in a computer. (Cognitive Knowledge Level: Apply)
	CO6	Explain the Vertex Color problem in graphs and illustrate an example application for vertex coloring. (Cognitive Knowledge Level: Apply)
CST 202 COMPUTER ORGANIZATION AND ARCHITECTURE	CO 1	Recognize and express the relevance of basic components, I/O organization and pipelining schemes in a digital computer (Cognitive knowledge: Understand)
	CO 2	Explain the types of memory systems and mapping functions used in memory systems (Cognitive Knowledge Level: Understand)
	CO 3	Demonstrate the control signals required for the execution of a given instruction (Cognitive Knowledge Level: Apply))
	CO 4	Illustrate the design of Arithmetic Logic Unit and explain the usage of registers in it (Cognitive Knowledge Level: Apply)
	CO 5	Explain the implementation aspects of arithmetic algorithms in a digital computer (Cognitive Knowledge Level: Apply)
	CO6	Develop the control logic for a given arithmetic problem (Cognitive Knowledge Level: Apply)
CST 204 DATABASE MANAGEMENT SYSTEMS	CO 1	Summarize and exemplify fundamental nature and characteristics of database systems (Cognitive Knowledge Level: Understand)
	CO 2	Model real word scenarios given as informal descriptions, using Entity Relationship diagrams. (Cognitive Knowledge Level: Apply)
	CO 3	Model and design solutions for efficiently representing and querying data using relational model (Cognitive Knowledge Level: Analyze)
	CO 4	Demonstrate the features of indexing and hashing in database applications (Cognitive Knowledge Level: Apply)
	CO 5	Discuss and compare the aspects of Concurrency Control and Recovery in Database systems (Cognitive Knowledge Level: Apply)
	CO6	Explain various types of NoSQL databases (Cognitive Knowledge Level: Understand)
CST 206 OPERATING SYSTEMS	CO 1	Explain the relevance, structure and functions of Operating Systems in computing devices. (Cognitive knowledge: Understand)



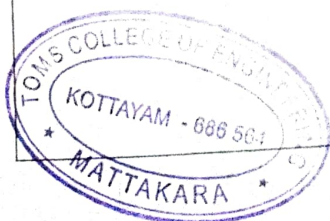
	CO 2	Illustrate the concepts of process management and process scheduling mechanisms employed in Operating Systems. (Cognitive knowledge: Understand)
	CO 3	Explain process synchronization in Operating Systems and illustrate process synchronization mechanisms using Mutex Locks, Semaphores and Monitors (Cognitive knowledge: Understand)
	CO 4	Explain any one method for detection, prevention, avoidance and recovery for managing deadlocks in Operating Systems. (Cognitive knowledge: Understand)
	CO 5	Explain the memory management algorithms in Operating Systems. (Cognitive knowledge: Understand)
	CO6	Explain the security aspects and algorithms for file and storage management in Operating Systems. (Cognitive knowledge: Understand)
EST 200 DESIGN & ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering.
	CO 2	Apply design thinking while learning and practicing engineering.
	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering.
HUT 200 PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.
	CO 2	Adopt a good character and follow an ethical life.
	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics
	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues..
MCN 202 CONSTITUTION OF INDIA	CO 1	Explain the background of the present constitution of India and features
	CO 2	Utilize the fundamental rights and duties
	CO 3	Understand the working of the union executive, parliament and judiciary.
	CO 4	Understand the working of the state executive, legislature and judiciary.
	CO 5	Utilize the special provisions and statutory institutions.
	CO6	Show national and patriotic spirit as responsible citizens of the country
CSL 202 DIGITAL LAB	CO 1	Design and implement combinational logic circuits using Logic Gates (Cognitive Knowledge Level: Apply)



CSL204 OPERATING STSTEMS LAB	CO 2	Design and implement sequential logic circuits using Integrated Circuits (Cognitive Knowledge Level: Apply)
	CO 3	Simulate functioning of digital circuits using programs written in a Hardware Description Language (Cognitive Knowledge Level: Apply)
	CO 4	Function effectively as an individual and in a team to accomplish a given task of designing and implementing digital circuits (Cognitive Knowledge Level: Apply)
	CO 1	Illustrate the use of systems calls in Operating Systems. (Cognitive knowledge: Understand)
	CO 2	Implement Process Creation and Inter Process Communication in Operating Systems. (Cognitive knowledge: Apply)
	CO 3	Implement First Come First Served, Shortest Job First, Round Robin and Prioritybased CPU Scheduling Algorithms. (Cognitive knowledge: Apply)
	CO 4	Illustrate the performance of First In First Out, Least Recently Used and Least Frequently Used Page Replacement Algorithms. (Cognitive knowledge: Apply)
	CO 5	Implement modules for Deadlock Detection and Deadlock Avoidance in Operating Systems. (Cognitive knowledge: Apply)
	CO 6	Implement modules for Storage Management and Disk Scheduling in Operating Systems. (Cognitive knowledge: Apply)

THIRD YEAR FIFTH SEMESTER

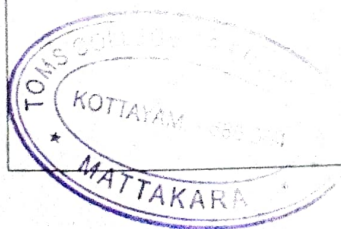
COURSE NAME AND CODE	#	STATEMENT
CST 301 FORMAL LANGUAGES AND AUTOMATA THEORY	CO 1	Classify a given formal language into Regular, Context-Free, Context Sensitive, Recursive or Recursively Enumerable. [Cognitive knowledge level: Understand]
	CO 2	Explain a formal representation of a given regular language as a finite state automaton, regular grammar, regular expression and Myhill-Nerode relation. [Cognitive knowledge level: Understand]
	CO 3	Design a Pushdown Automaton and a Context-Free Grammar for a given context-free language. [Cognitive knowledge level : Apply]
	CO 4	Design Turing machines as language acceptors



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CST 303 COMPUTER NETWORKS		or transducers. [Cognitive knowledge level: Apply]
	CO 5	Explain the notion of decidability. [Cognitive knowledge level: Understand]
	CO 1	Explain the features of computer networks, protocols, and network design models (Cognitive Knowledge: Understand)
	CO 2	Describe the fundamental characteristics of the physical layer and identify the usage in network communication (Cognitive Knowledge: Apply)
	CO 3	Explain the design issues of data link layer, link layer protocols, bridges and switches (Cognitive Knowledge: Understand)
	CO 4	Illustrate wired LAN protocols (IEEE 802.3) and wireless LAN protocols (IEEE 802.11) (Cognitive Knowledge: Understand)
	CO 5	Select appropriate routing algorithms, congestion control techniques, and Quality of Service requirements for a network (Cognitive Knowledge: Apply)
CST 305 SYSTEM SOFTWARE	CO 6	Illustrate the functions and protocols of the network layer, transport layer, and application layer in inter-networking (Cognitive Knowledge: Understand)
	CO 1	Distinguish softwares into system and application software categories. (Cognitive Knowledge Level: Understand)
	CO 2	Identify standard and extended architectural features of machines. (Cognitive Knowledge Level: Apply)
	CO 3	Identify machine dependent features of system software (Cognitive Knowledge Level: Apply)
	CO 4	Identify machine independent features of system software. (Cognitive Knowledge Level: Understand)
	CO 5	Design algorithms for system softwares and analyze the effect of data structures. (Cognitive Knowledge Level: Apply)
CST 307 MICROPROCESSORS AND MICROCONTROLLERS	CO 6	Understand the features of device drivers and editing & debugging tools.(Cognitive Knowledge Level: Understand)
	CO 1	Illustrate the architecture, modes of operation and addressing modes of microprocessors (Cognitive knowledge: Understand)
	CO 2	Develop 8086 assembly language programs. (Cognitive Knowledge Level: Apply)
	CO 3	Demonstrate interrupts, its handling and programming in 8086. (Cognitive Knowledge Level: Apply))
	CO 4	Illustrate how different peripherals (8255,8254,8257) and memory are interfaced



CST 309 MANAGEMENT OF SOFTWARE SYSTEMS		with microprocessors. (Cognitive Knowledge Level: Understand)
	CO 5	Outline features of microcontrollers and develop low level programs. (Cognitive Knowledge Level: Understand)
	CO 1	Demonstrate Traditional and Agile Software Development approaches (Cognitive Knowledge Level: Apply)
	CO 2	Prepare Software Requirement Specification and Software Design for a given problem. (Cognitive Knowledge Level: Apply)
	CO 3	Justify the significance of design patterns and licensing terms in software development, prepare testing, maintenance and DevOps strategies for a project. (Cognitive Knowledge Level: Apply)
	CO 4	Make use of software project management concepts while planning, estimation, scheduling, tracking and change management of a project, with a traditional/agile framework. (Cognitive Knowledge Level: Apply)
	CO 5	Utilize SQA practices, Process Improvement techniques and Technology advancements in cloud based software models and containers & microservices. (Cognitive Knowledge Level: Apply)
MCN 301 DISASTER MANAGEMENT	CO 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).
	CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand).
	CO 3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand)
	CO 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)
	CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand)
	CO 6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level

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CSL 331 SYSTEM SOFTWARE AND MICROPROCESSORS LAB	CO 1	(Cognitive knowledge level: Understand). Develop 8086 programs and execute it using a microprocessor kit. (Cognitive Knowledge Level: Apply)
	CO 2	Develop 8086 programs and, debug and execute it using MASM assemblers (Cognitive Knowledge Level: Apply)
	CO 3	Develop and execute programs to interface stepper motor, 8255, 8279 and digital to analog converters with 8086 trainer kit (Cognitive Knowledge Level: Apply)
	CO 4	Implement and execute different scheduling and paging algorithms in OS (Cognitive Knowledge Level: Apply)
	CO 5	Design and implement assemblers, Loaders and macroprocessors. (Cognitive Knowledge Level: Apply)
CSL 333 DATABASE MANAGEMENT SYSTEMS LAB	CO 1	Design database schema for a given real world problem-domain using standard design and modeling approaches. (Cognitive Knowledge Level: Apply)
	CO 2	Construct queries using SQL for database creation, interaction, modification, and updation. (Cognitive Knowledge Level: Apply)
	CO 3	Design and implement triggers and cursors. (Cognitive Knowledge Level: Apply)
	CO 4	Implement procedures, functions, and control structures using PL/SQL. (Cognitive Knowledge Level: Apply)
	CO 5	Perform CRUD operations in NoSQL Databases. (Cognitive Knowledge Level: Apply)
	CO 6	Develop database applications using front-end tools and back-end DBMS. (Cognitive Knowledge Level: Create)

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THIRD YEAR SIXTH SEMESTER

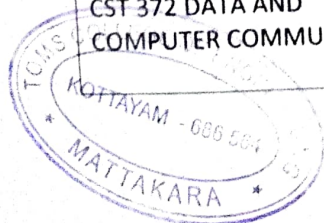
COURSE NAME AND CODE	#	STATEMENT
CST 302 COMPILER DESIGN	CO 1	Explain the phases in compilation process (lexical analysis, syntax analysis, semantic analysis, intermediate code generation, code optimization and code generation) and model a lexical analyzer (Cognitive Knowledge Level: Apply)
	CO 2	Model language syntax using Context Free Grammar and develop parse tree representation using leftmost and rightmost derivations (Cognitive Knowledge Level: Apply)
	CO 3	Compare different types of parsers (Bottom-up and Top-down) and construct parser for a given grammar (Cognitive Knowledge Level: Apply)
	CO 4	Build Syntax Directed Translation for a context free grammar, compare various storage

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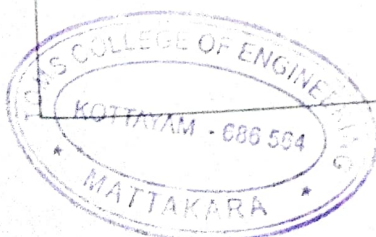
CST 304 COMPUTER GRAPHICS AND IMAGE PROCESSING		allocation strategies and classify intermediate representations (Cognitive Knowledge Level: Apply)
	CO 5	Illustrate code optimization and code generation techniques in compilation (Cognitive Knowledge Level: Apply)
	CO 1	Describe the working principles of graphics devices (Cognitive Knowledge level: Understand)
	CO 2	Illustrate line drawing, circle drawing and polygon filling algorithms (Cognitive Knowledge level: Apply)
	CO 3	Demonstrate geometric representations, transformations on 2D & 3D objects, clipping algorithms and projection algorithms (Cognitive Knowledge level: Apply)
	CO 4	Summarize visible surface detection methods (Cognitive Knowledge level: Understand)
	CO 5	Summarize the concepts of digital image representation, processing and demonstrate pixel relationships (Cognitive Knowledge level: Apply)
CST 306 ALGORITHM ANALYSIS AND DESIGN	CO 6	Solve image enhancement and segmentation problems using spatial domain techniques (Cognitive Knowledge level: Apply)
	CO 1	Analyze any given algorithm and express its time and space complexities in asymptotic notations. (Cognitive Level: Apply)
	CO 2	Derive recurrence equations and solve it using Iteration, Recurrence Tree, Substitution and Master's Method to compute time complexity of algorithms. (Cognitive Level: Apply)
	CO 3	Illustrate Graph traversal algorithms & applications and Advanced Data structures like AVL trees and Disjoint set operations. (Cognitive Level: Apply)
	CO 4	Demonstrate Divide-and-conquer, Greedy Strategy, Dynamic programming, Branch-and-Bound and Backtracking algorithm design techniques (Cognitive Level: Apply)
	CO 5	Classify a problem as computationally tractable or intractable, and discuss strategies to address intractability (Cognitive Level: Understand)
PROGRAM ELECTIVE I CST 372 DATA AND COMPUTER COMMUNICATION	CO 6	Identify the suitable design strategy to solve a given problem. (Cognitive Level: Analyze)
	CO 1	Identify the characteristics of signals for analog and digital transmissions (Cognitive knowledge: Apply)
	CO 2	Identify the issues in data transmission



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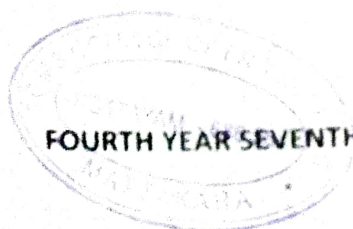
		(Cognitive knowledge: Apply)
	CO 3	Select transmission media based on characteristics and propagation modes (Cognitive knowledge: Apply)
	CO 4	Choose appropriate signal encoding techniques for a given scenario (Cognitive knowledge: Apply)
	CO 5	Illustrate multiplexing and spread spectrum technologies (Cognitive knowledge: Apply)
	CO 6	Use error detection, correction and switching techniques in data communication (Cognitive knowledge: Apply)
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. (Cognitive knowledge level: Understand)
	CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
	CO 3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)
	CO 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)
	CO 5	Determine the impact of changes in global economic policies on the business opportunities of a firm. (Cognitive knowledge level: Analyse)
CST 308 COMPREHENSIVE COURSE WORK	CO 1	Comprehend the concepts of discrete mathematical structures (Cognitive Knowledge Level: Understand)
	CO 2	Comprehend the concepts and applications of data structures (Cognitive Knowledge Level: Understand)
	CO 3	Comprehend the concepts, functions and algorithms in Operating System (Cognitive Knowledge Level: Understand)
	CO 4	Comprehend the organization and architecture of computer systems (Cognitive Knowledge Level: Understand)
	CO 5	Comprehend the fundamental principles of database design and manipulation (Cognitive Knowledge Level: Understand)
	CO 6	Comprehend the concepts in formal languages and automata theory Cognitive Knowledge



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CSL 332 NETWORKING LAB		Level: Understand)
	CO 1	Use network related commands and configuration files in Linux Operating System. (Cognitive Knowledge Level: Understand).
	CO 2	Develop network application programs and protocols. (Cognitive Knowledge Level: Apply)
	CO 3	Analyze network traffic using network monitoring tools. (Cognitive Knowledge Level: Apply)
	CO 4	Design and setup a network and configure different network protocols. (Cognitive Knowledge Level: Apply)
	CO 5	Develop simulation of fundamental network concepts using a network simulator. (Cognitive Knowledge Level: Apply)
CSD 334 MINIPROJECT	CO 1	Identify technically and economically feasible problems (Cognitive Knowledge Level: Apply)
	CO 2	Identify and survey the relevant literature for getting exposed to related solutions and get familiarized with software development processes (Cognitive Knowledge Level: Apply)
	CO 3	Perform requirement analysis, identify design methodologies and develop adaptable & reusable solutions of minimal complexity by using modern tools & advanced programming techniques (Cognitive Knowledge Level: Apply)
	CO 4	Prepare technical report and deliver presentation (Cognitive Knowledge Level: Apply)
	CO 5	Apply engineering and management principles to achieve the goal of the project (Cognitive Knowledge Level: Apply)

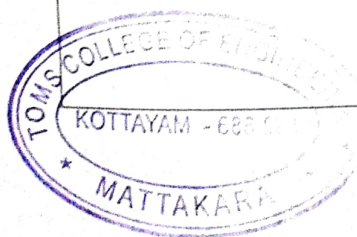


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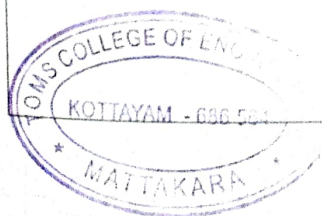
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COURSE NAME AND CODE	#	STATEMENT
CST 401 ARTIFICIAL INTELLIGENCE	CO 1	Explain the fundamental concepts of intelligent systems and their architecture. (Cognitive Knowledge Level: Understanding)
	CO 2	Illustrate uninformed and informed search techniques for problem solving in intelligent systems. (Cognitive Knowledge Level: Understanding)
	CO 3	Solve Constraint Satisfaction Problems using search techniques. (Cognitive Knowledge Level: Apply)
	CO 4	Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems. (Cognitive Knowledge Level: Apply)
	CO 5	Illustrate different types of learning techniques used in intelligent systems (Cognitive Knowledge Level: Understand)
RENEWABLE ENERGY ENGINEERING	CO 1	Explain renewable energy sources and evaluate the implication of renewable energy. To predict solar radiation at a location
	CO 2	Explain solar energy collectors, storages, solar cell characteristics and applications
	CO 3	Explain the different types of wind power machines and control strategies of wind turbines
	CO 4	Explain the ocean energy and conversion devices and different Geothermal sources
	CO 5	Explain biomass energy conversion devices. Calculate the Net Present value and payback period
PROGRAM ELECTIVE II CST 413 MACHINE LEARNING	CO 1	Illustrate Machine Learning concepts and basic parameter estimation methods. (Cognitive Knowledge Level: Apply)
	CO 2	Demonstrate supervised learning concepts (regression, linear classification). (Cognitive Knowledge Level: Apply)
	CO 3	Illustrate the concepts of Multilayer neural network and Support Vector Machine (Cognitive Knowledge Level: Apply)
	CO 4	Describe unsupervised learning concepts and dimensionality reduction techniques. (Cognitive Knowledge Level: Apply)
	CO 5	Solve real life problems using appropriate machine learning models and evaluate the performance measures (Cognitive Knowledge Level: Apply)
MCN 401 INDUSTRIAL SAFETY ENGINEERING	CO 1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)
	CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge



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		level: Understand)
	CO 3	Explain different issues in construction industries. (Cognitive Knowledge level: Understand)
	CO 4	Describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand)
	CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)
CSL 411 COMPILER LAB	CO 1	Implement lexical analyzer using the tool LEX. (Cognitive Knowledge Level: Apply)
	CO 2	Implement Syntax analyzer using the tool YACC. (Cognitive Knowledge Level: Apply)
	CO 3	Design NFA and DFA for a problem and write programs to perform operations on it. (Cognitive Knowledge Level: Apply)
	CO 4	Design and Implement Top-Down parsers. (Cognitive Knowledge Level: Apply)
	CO 5	Design and Implement Bottom-Up parsers. (Cognitive Knowledge Level: Apply)
	CO 6	Implement intermediate code for expressions. (Cognitive Knowledge Level: Apply)
CSQ 413 SEMINAR	CO 1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply).
	CO 2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
	CO 3	Prepare a presentation about an academic document (Cognitive knowledge level: Create).
	CO 4	Give a presentation about an academic document (Cognitive knowledge level: Apply)
	CO 5	Prepare a technical report (Cognitive knowledge level: Create).
CSD 415 PROJECT PHASE I	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply)
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
	CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO 5	Identify technology/research gaps and propose



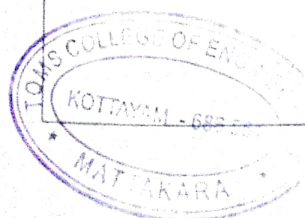
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		innovative/creative solutions (Cognitive knowledge level: Analyze).
	CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).

FOURTH YEAR EIGHTH SEMESTER

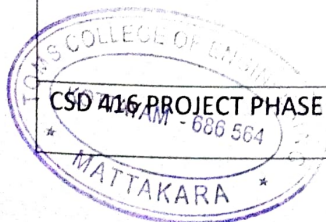
COURSE NAME AND CODE	#	STATEMENT
CST 402 DISTRIBUTED COMPUTING	CO 1	Summarize various aspects of distributed computation model and logical time. (Cognitive Knowledge Level: Understand)
	CO 2	Illustrate election algorithm, global snapshot algorithm and termination detection algorithm. (Cognitive Knowledge Level: Apply)
	CO 3	Compare token based, non-token based and quorum based mutual exclusion algorithms. (Cognitive Knowledge Level: Understand)
	CO 4	Recognize the significance of deadlock detection and shared memory in distributed systems. (Cognitive Knowledge Level: Understand)
	CO 5	Explain the concepts of failure recovery and consensus. (Cognitive Knowledge Level: Understand)



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PROGRAM ELECTIVE III CST 464 EMBEDDED SYSTEMS	CO 6	Illustrate distributed file system architectures. (Cognitive Knowledge Level: Understand)
	CO 1	Describe the characteristics of different hardware/software components of an embedded system. (Cognitive Knowledge Level: Understand)
	CO 2	Map the design of an embedded system to an appropriate computational model. (Cognitive Knowledge Level: Apply)
	CO 3	Recommend appropriate process synchronization / communication / scheduling mechanisms for specific system scenarios. (Cognitive Knowledge Level: Analyze)
	CO 4	Describe the role of real-time operating systems in embedded devices. (Cognitive Knowledge Level: Understand)
	CO 5	Make use of design strategies for developing real-world embedded systems. (Cognitive Knowledge Level: Apply)
PROGRAM ELECTIVE IV CST 466 DATA MINING	CO 1	Employ the key process of data mining and data warehousing concepts in application domains. (Cognitive Knowledge Level: Understand)
	CO 2	Make use of appropriate preprocessing techniques to convert raw data into suitable format for practical data mining tasks (Cognitive Knowledge Level: Apply)
	CO 3	Illustrate the use of classification and clustering algorithms in various application domains (Cognitive Knowledge Level: Apply)
	CO 4	Comprehend the use of association rule mining techniques. (Cognitive Knowledge Level: Apply)
	CO 5	Explain advanced data mining concepts and their applications in emerging domains (Cognitive Knowledge Level: Understand)
PROGRAM ELECTIVE V CST 438 IMAGE PROCESSING TECHNIQUE	CO 1	Explain the concepts of image formation and the basis of digital image processing. (Cognitive Knowledge Level: Understand)
	CO 2	Demonstrate the role of image transforms in representing, highlighting, and modifying image features. (Cognitive Knowledge Level: Apply)
	CO 3	Solve image enhancement problems using spatial and frequency domain techniques. (Cognitive Knowledge Level: Apply)
	CO 4	Make use of the concept of image restoration and image segmentation techniques in real-world problems. (Cognitive Knowledge Level: Apply)
	CO 5	Interpret morphological operations, image representation, and description techniques. (Cognitive Knowledge Level: Understand)
CSD 416 PROJECT PHASE II	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge



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

COURSE OUTCOMES

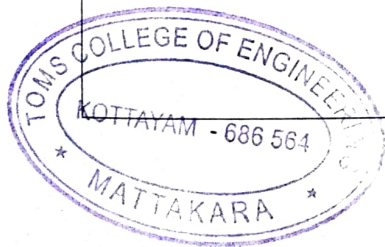
DEPARTMENT OF MECHANICAL ENGINEERING



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SECOND YEAR THIRD SEMESTER

COURSE TITLE AND CODE	#	STATEMENT
MAT201 PARTIAL DIFFERENTIAL EQUATION 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



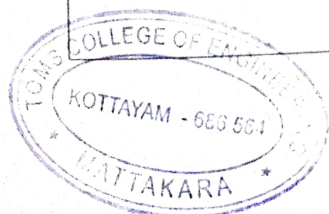
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		function about a singularity and Apply residue theorem to compute several kinds of real integrals.
MET201 MECHANICS OF SOLIDS	CO 1	Determine the stresses, strains and displacements of structures by tensorial and graphical (Mohr's circle) approaches
	CO 2	Analyse the strength of materials using stress-strain relationships for structural and thermal loading
	CO 3	Perform basic design of shafts subjected to torsional loading and analyse beams subjected to bending moments
	CO 4	Determine the deformation of structures subjected to various loading conditions using strain energy methods
	CO 5	Analyse column buckling and appreciate the theories of failures and its relevance in engineering design
MET203 MECHANICS OF FLUIDS	CO 1	Define Properties of Fluids and Solve hydrostatic problems
	CO 2	Explain fluid kinematics and Classify fluid flows
	CO 3	Interpret Euler and Navier-Stokes equations and Solve problems using Bernoulli's equation
	CO 4	Evaluate energy losses in pipes and sketch energy gradient lines
	CO 5	Explain the concept of boundary layer and its applications
	CO 6	Use dimensional Analysis for model studies
MET205 METALLURGY & MATERIAL SCIENCE	CO 1	Understand the basic chemical bonds, crystal structures (BCC, FCC, and HCP), and their relationship with the properties.
	CO 2	Analyze the microstructure of metallic materials using phase diagrams and modify the microstructure and properties using different heat treatments.
	CO 3	How to quantify mechanical integrity and failure in materials.
	CO 4	Apply the basic principles of ferrous and non-ferrous metallurgy for selecting materials for specific applications.
	CO 5	Define and differentiate engineering materials on the basis of structure and properties for engineering applications.
EST200 DESIGN AND ENGINEERING	CO 1	Explain the different concepts and principles involved in design engineering
	CO 2	Apply design thinking while learning and practicing engineering.
	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering
	CO 1	Understand the core values that shape the ethical behaviour of a professional



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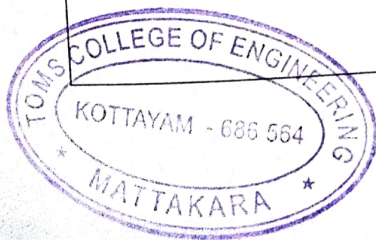
	CO 2	Adopt a good character and follow an ethical life.
	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics
	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
MCN201 SUSTAINABLE ENGINEERING	CO 1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
	CO 2	Explain the different types of environmental pollution problems and their sustainable solutions
	CO 3	Discuss the environmental regulations and standards
	CO 4	Outline the concepts related to conventional and non-conventional energy
	CO 5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
MEL201 COMPUTER AIDED MACHINE DRAWING	CO 1	Apply the knowledge of engineering drawings and standards to prepare standard dimensioned drawings of machine parts and other engineering components.
	CO 2	Prepare standard assembly drawings of machine components and valves using part drawings and bill of materials.
	CO 3	Apply limits and tolerances to components and choose appropriate fits for given assemblies
	CO 4	Interpret the symbols of welded, machining and surface roughness on the component drawings.
	CO 5	Prepare part and assembly drawings and Bill of Materials of machine components and valves using CAD software.
MEL203 MATERIALS TESTING LAB	CO 1	To understand the basic concepts of analysis of circular shafts subjected to torsion.
	CO 2	To understand the behaviour of engineering component subjected to cyclic loading and failure concepts
	CO 3	Evaluate the strength of ductile and brittle materials subjected to compressive, Tensile shear and bending forces
	CO 4	Evaluate the microstructural morphology of ductile or brittle materials and its fracture modes (ductile /brittle fracture) during tension test
	CO 5	To specify suitable material for applications in the field of design and manufacturing



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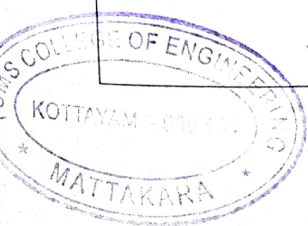
SECOND YEAR FOURTH SEMESTER

COURSE TITLE AND CODE	#	STATEMENT
MAT202 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.



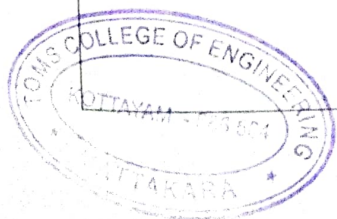
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	CO 3	Perform statistical inferences concerning characteristics of a population based on attributes of samples drawn from the population
	CO 4	Compute roots of equations, evaluate definite integrals and perform interpolation on given numerical data 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.
MET202 ENGINEERING THERMODYNAMICS	CO 1	Understand basic concepts and laws of thermodynamics
	CO 2	Conduct first law analysis of open and closed systems
	CO 3	Determine entropy and availability changes associated with different processes
	CO 4	Understand the application and limitations of different equations of state
	CO 5	Determine change in properties of pure substances during phase change processes
	CO 6	Evaluate properties of ideal gas mixtures
MET204 MANUFACTURING PROCESS	CO 1	Illustrate the basic principles of foundry practices and special casting processes, their advantages, limitations and applications.
	CO 2	Categorize welding processes according to welding principle and material.
	CO 3	Understand requirements to achieve sound welded joint while welding different similar and dissimilar engineering materials.
	CO 4	Student will estimate the working loads for pressing, forging, wire drawing etc. processes
	CO 5	Recommend appropriate part manufacturing processes when provided a set of functional requirements and product development constraints.
MET206 FLUID MACHINERY	CO 1	Explain the characteristics of centrifugal and reciprocating pumps
	CO 2	Calculate forces and work done by a jet on fixed or moving plate and curved plates
	CO 3	Explain the working of turbines and Select a turbine for specific application.
	CO 4	Analyse the working of air compressors and Select the suitable one based on application.
	CO 5	Analyse gas turbines and Identify the improvements in basic gas turbine cycles.
	CO 6	Explain the characteristics of centrifugal and



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EST200 DESIGN AND ENGINEERING	CO 1	reciprocating pumps Explain the different concepts and principles involved in design engineering.
	CO 2	Apply design thinking while learning and practicing engineering.
	CO 3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering
HUT200 PROFESSIONAL ETHICS	CO 1	Understand the core values that shape the ethical behaviour of a professional.
	CO 2	Adopt a good character and follow an ethical life
	CO 3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
	CO 4	Solve moral and ethical problems through exploration and assessment by established experiments.
	CO 5	Apply the knowledge of human values and social values to contemporary ethical values and global issues.
MCN202 CONSTITUTION OF INDIA	CO 1	Explain the background of the present constitution of India and features
	CO 2	Utilize the fundamental rights and duties.
	CO 3	Understand the working of the union executive, parliament and judiciary.
	CO 4	Understand the working of the state executive, legislature and judiciary
	CO 5	Utilize the special provisions and statutory institutions.
	CO 6	Show national and patriotic spirit as responsible citizens of the country
MEL202 FM & HM LAB	CO 1	Determine the coefficient of discharge of flow measuring devices (notches, orifice meter and Venturi meter)
	CO 2	Calibrate flow measuring devices (notches, orifice meter and Venturi meter)
	CO 3	Evaluate the losses in pipe
	CO 4	Determine the metacentric height and stability of floating bodies
	CO 5	Determine the efficiency and plot the characteristic curves of different types of pumps and turbines
MEL204 MACHINE TOOLS LAB-I	CO 1	The students can operate different machine tools with understanding of work holders and operating principles to produce different part features to the desired quality.
	CO 2	Apply cutting mechanics to metal machining based on cutting force and power consumption.
	CO 3	Select appropriate machining processes and process parameters for different metals.
	CO 4	Fabricate and assemble various metal



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		components by welding and students will be able to visually examine their work and that of others for discontinuities and defects.
	CO 5	Infer the changes in properties of steel on annealing, normalizing, hardening and tempering.

THIRD YEAR FIFTH SEMESTER

COURSE TITLE AND CODE	#	STATEMENT
MET301 MECHANICS OF MACHINERY	CO 1	Explain the fundamentals of kinematics, various planar mechanisms and interpret the basic principles of mechanisms and machines
	CO 2	Perform analysis and synthesis of mechanisms
	CO 3	Solve the problem on cams and gear drives, including selection depending on requirement.
	CO 4	Calculate the gyroscopic effect in various situations
	CO 5	Analyse rotating and reciprocating masses for its unbalance
MET303 THERMAL	CO 1	Explain the working of steam power cycle and

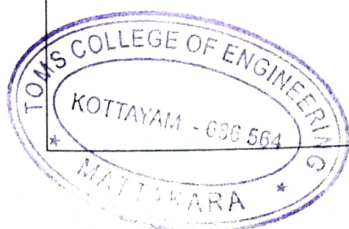


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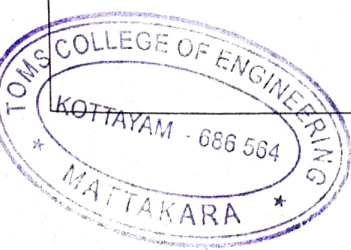
ENGINEERING		related components
	CO 2	Discuss the working of steam turbines and methods for evaluating the performance
	CO 3	Illustrate the performance testing and evaluation of IC engines
	CO 4	Explain the combustion phenomenon and pollution in IC engines
	CO 5	Discuss the principles of refrigeration and air-conditioning and basic design considerations
MET305 INDUSTRIAL & SYSTEMS ENGINEERING	CO 1	Implement various tools and techniques in industrial engineering
	CO 2	Calculate the inventory system for a given requirement
	CO 3	Explain the importance of industrial relations CO
	CO 4	Select the lean manufacturing tools to find and eliminate wastes
	CO 5	Identify the framework of agile manufacturing
	CO 6	Identify core and extended modules of enterprise resource planning
MET307 MACHINE TOOLS AND METROLOGY	CO 1	Analyze various machining process and calculate relevant quantities such as velocities, forces and powers.
	CO 2	Analyze of the tool nomenclature with surface roughness obtainable in each machining processes.
	CO 3	Understand the limitations of various machining process with regard to shape formation and surface texture
	CO 4	Demonstrate knowledge of the underlying principles of measurement, as they relate to mechanical measurement, electronic instrumentation, and thermal effects.
	CO 5	Get an exposure to advanced measuring devices and machine tool metrology.
HUT300 INDUSTRIAL ECONOMICS AND 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. (Cognitive knowledge level: Understand)
	CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
	CO 3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)
	CO 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)
	CO 5	Determine the impact of changes in global economic policies on the business opportunities

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HUT310 MANAGEMENT FOR ENGINEERS	CO 1	of a firm. (Cognitive knowledge level: Analyse) Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).
	CO 2	Describe the functions of management (Cognitive Knowledge level: Understand).
	CO 3	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand).
	CO 4	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply).
	CO 5	Summarize the functional areas of management (Cognitive Knowledge level: Understand).
	CO 6	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).
MCN301 DISASTER MANAGEMENT	CO 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).
	CO 2	Distinguish between different hazard types and vulnerability types and do vulnerability assessment (Cognitive knowledge level: Understand).
	CO 3	Identify the components and describe the process of risk assessment, and apply appropriate methodologies to assess risk (Cognitive knowledge level: Understand).
	CO 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)
	CO 5	Identify factors that determine the nature of disaster response and discuss the various disaster response actions (Cognitive knowledge level: Understand).
	CO 6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level (Cognitive knowledge level: Understand).
MEL331 MACHINE TOOLS LAB-II	CO 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.
	CO 2	Determine limits and fits and allocate tolerances for machine components
	CO 3	CNC programming and to use coordinate



		measuring machine to record measurements of complex profiles with high sensitivity
	CO 4	Use effective methods of measuring straightness, Squareness, flatness, roundness, profile, screw threads and gear teeth.
	CO 5	Securing knowledge of manufacturing components within the tolerance limit and surface roughness according to given drawings using various machine tools.
MEL333 THERMAL ENGINEERING LAB-I	CO 1	Measure thermo-physical properties of solid, liquid and gaseous fuels
	CO 2	Identify various systems and subsystems of Diesel and petrol engines
	CO 3	Analyse the performance characteristics of internal combustion engines
	CO 4	Investigate the emission characteristics of exhaust gases from IC Engines
	CO 5	Interpret the performance characteristics of air compressors / blowers

Third YEAR SIXTHSEMESTER

COURSE TITLE AND CODE	#	STATEMENT
MET302 HEAT & MASS TRANSFER	CO 1	Apply principles of heat and mass transfer to engineering problems
	CO 2	Analyse and obtain solutions to problems involving various modes of heat transfer
	CO 3	Design heat transfer systems such as heat exchangers, fins, radiation shields etc.
	CO 4	Define laminar and turbulent boundary layers and ability to formulate energy equation in flow systems
MET304 DYNAMICS AND DESIGN OF MACHINERY	CO 1	Do engine force analysis and to draw turning moment diagrams



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	CO 2	Analyse free and forced vibrations of single degree of freedom systems
	CO 3	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
	CO 4	Design machine elements subjected to fatigue loading and riveted joints
	CO 5	Design welded joint and close coiled helical compression spring
MET306 ADVANCED MANUFACTURING ENGINEERING	CO 1	To be conversant with the advanced machining process and to appreciate the effect of process parameters on the surface integrity aspects during the advanced machining process.
	CO 2	CNC programming, select appropriate tooling and fixtures.
	CO 3	To categorize the various nontraditional material removal process based on energy sources and mechanism employed.
	CO 4	Analyze the processes and evaluate the role of each process parameter during micro machining of various advanced material removal processes
	CO 5	Explain the processes used in additive manufacturing for a range of materials and applications
METXXX PROGRAM ELECTIVE I MET312 NONDESTRUCTIVE TESTING	CO 1	To introduce the basic principles, techniques, equipment, applications and limitations of NDT methods such as Visual, Penetrant Testing, Magnetic Particle Testing, Ultrasonic Testing, Radiography, Eddy Current.
	CO 2	To enable selection of appropriate NDT methods.
	CO 3	To identify advantages and limitations of nondestructive testing methods
	CO 4	To make aware the developments and future trends in NDT.
HUT300 INDUSTRIAL ECONOMICS AND 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. (Cognitive knowledge level: Understand)
	CO 2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production. (Cognitive knowledge level: Apply)
	CO 3	Determine the functional requirement of a firm under various competitive conditions. (Cognitive knowledge level: Analyse)
	CO 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)
	CO 5	Determine the impact of changes in global economic policies on the business opportunities

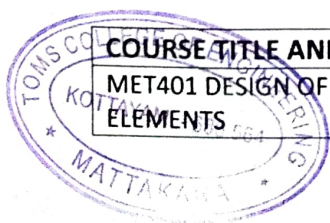


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HUT310 MANAGEMENT FOR ENGINEERS	CO 1	of a firm. (Cognitive knowledge level: Analyse) Explain the characteristics of management in the contemporary context (Cognitive Knowledge level: Understand).
	CO 2	Describe the functions of management (Cognitive Knowledge level: Understand).
	CO 3	Demonstrate ability in decision making process and productivity analysis (Cognitive Knowledge level: Understand).
	CO 4	Illustrate project management technique and develop a project schedule (Cognitive Knowledge level: Apply).
	CO 5	Summarize the functional areas of management (Cognitive Knowledge level: Understand).
	CO 6	Comprehend the concept of entrepreneurship and create business plans (Cognitive Knowledge level: Understand).
MET308 COMPREHENSIVE COURSE WORK	CO 1	Learn to prepare for a competitive examination
	CO 2	Comprehend the questions in Mechanical Engineering field and answer them with confidence
	CO 3	Communicate effectively with faculty in scholarly environments
	CO 4	Analyze the comprehensive knowledge gained in basic courses in the field of Mechanical Engineering
MEL332 COMPUTER AIDED DESIGN & ANALYSIS LAB	CO 1	Gain working knowledge in Computer Aided Design and modelling procedures.
	CO 2	Gain knowledge in creating solid machinery parts.
	CO 3	Gain knowledge in assembling machine elements.
	CO 4	Gain working knowledge in Finite Element Analysis.
	CO 5	Solve simple structural, heat and fluid flow problems using standard software
MEL334 THERMAL ENGINEERING LAB-II	CO 1	Evaluate thermal properties of materials in conduction, convection and radiation
	CO 2	Analyse the performance of heat exchangers
	CO 3	Illustrate the operational performances of refrigeration and air conditioning systems
	CO 4	Perform calibration of thermocouples and pressure gauges

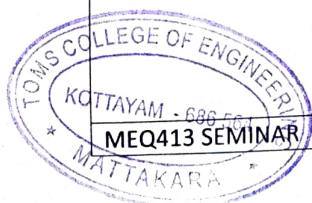
FOURTH YEAR SEVENTH SEMESTER

COURSE TITLE AND CODE	#	STATEMENT
MET401 DESIGN OF MACHINE ELEMENTS	CO 1	Design shafts based on strength, rigidity and design for static and fatigue loads, design flat belts



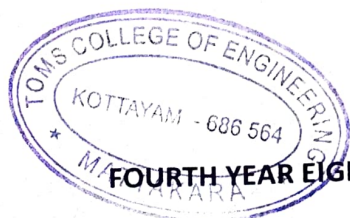
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		and connecting rod of IC engines
	CO 2	Design clutches and brakes
	CO 3	Analyse sliding contact bearings and understand design procedure of journal, ball and roller bearings
	CO 4	Design Spur gear and helical gear
	CO 5	Design Bevel gears and worm gears
PROGRAM ELECTIVE II MET443 AEROSPACE ENGINEERING	CO 1	Explain the characteristics of atmosphere
	CO 2	Discuss airfoil theory, 2D, 3D or Finite aero foils
	CO 3	Explain perform analysis of flight dynamics of aircrafts
	CO 4	Understand different flight instruments
	CO 5	Discuss the principles of wind tunnel testing
RENEWABLE ENERGY ENGINEERING	CO 1	Explain renewable energy sources and evaluate the implication of renewable energy. To predict solar radiation at a location
	CO 2	Explain solar energy collectors, storages, solar cell characteristics and applications
	CO 3	Explain the different types of wind power machines and control strategies of wind turbines
	CO 4	Explain the ocean energy and conversion devices and different Geothermal sources
	CO 5	Explain biomass energy conversion devices. Calculate the Net Present value and payback period
MCN401 INDUSTRIAL SAFETY ENGINEERING	CO 1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)
	CO 2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand)
	CO 3	Explain different issues in construction industries. (Cognitive Knowledge level: Understand)
	CO 4	Describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand)
	CO 5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)
MEL411 MECHANICAL ENGINEERING LAB	CO 1	Get practical knowledge on design and analysis of mechanisms in the machines.
	CO 2	Measure the cutting forces associated with milling machining operations.
	CO 3	Apply the basic concepts of hydraulic and pneumatic actuators and their applications in product and processes
	CO 4	Use appropriate systems for data acquisition and control of product and processes
	CO 1	Identify academic documents from the literature



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		which are related to her/his areas of interest (Cognitive knowledge level: Apply).
	CO 2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
	CO 3	Prepare a presentation about an academic document (Cognitive knowledge level: Create).
	CO 4	Give a presentation about an academic document (Cognitive knowledge level: Apply).
	CO 5	Prepare a technical report (Cognitive knowledge level: Create)
MED415 PROJECT PHASE I	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
	CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO 5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
	CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).



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COURSE TITLE AND CODE	#	STATEMENT
MET402 MECHATRONICS	CO 1	Explain the sensors and actuators used in mechatronics
	CO 2	Design hydraulic and pneumatic circuits for automation.
	CO 3	Explain the manufacturing processes used in MEMS
	CO 4	Demonstrate the various components of a CNC machine
	CO 5	Create a PLC program
	CO 6	Explain the robotic sensors and vision system
MED416 PROJECT PHASE II	CO 1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
	CO 2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
	CO 3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply)
	CO 4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply)
	CO 5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
	CO 6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).

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