lendi Institute of Engineering & Technology
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Approved by A.I.C.T.E. & Permanently Affiliated to J. N. T. U. Gurajada, VIZIANAGARAM
Via 5th APSP Battalion, Jonnada (V), Denkada (M), NH-3, Vizianagaram Dist - 535005, A.P. Website : www.lendi.org
Ph : 08922-241111, 241666, Cell No : 9490344747, 9490304747,e-mail : lendi_2008@yahoo.com

DEPARTMENT OF MECHANICAL ENGINEERING

R23 Regulation Course Outcomes

I YEAR I SEMESTER		
Course Code	**Course Title**	**Course Outcomes**
R23BSH-MA1101	Linear Algebra & Calculus	Apply the Methods for solving linear equations to engineering applications.
		Apply the concepts of eigen values and eigen vectors to free vibration of a two mass system.
		Apply mean value theorems to real world problems.
		Find maxima and minima of functions of several variables
		Evaluate the volume and surface area of solids using multiple integrals.
R23BSH-CH1101	Engineering Chemistry	Determine the hardness of water using EDTA method, compare specifications of drinking water as BIS and WHO standards.
		Compare the materials of construction for battery and demonstrate the corrosion prevention methods and factors affecting corrosion.
		Categorize thermoplastics, thermosettings, elastomers conducting polymers and biodegradable polymers and calculate the calorific value of fuels.
		Classify composite materials, refractories, and lubricants. Demonstrate the setting and hardening of cement.
		Apply the principles of green chemistry and nanomaterials in ecofriendly chemical reactions and preparation of engineering materials respectively.
R23CSE-ES1101	Introduction to Programming	Understand basics of computers, the concept of algorithm and problem solving analysis.
		Understand the concepts of control structures, branching and looping statements.
		Apply the concepts of arrays in solving complex problems.
		Develop programs on modular programming using functions and strings.
		Develop an ability to debug and optimize the code and solve real time problem statements.

R23MEC-ES1101	Engineering Graphics	Understand the basics of Engineering Graphics to construct the polygon, curves and scales.
		Draw the orthographic projections of points and straight lines inclined to both the planes.
		Draw the projections of planes in various conditions.
		Draw the projections of regular solids, with its axis inclined to one plane and sections of solids.
		Visualize the 3D isometric views from 2D orthographic views and vice versa along with basic introduction to CAD.
R23EEE-ES1101	Basic Electrical & Electronics Engineering	Understand the problem solving concepts associated to dc and ac circuits.
		Understand the principle and operation of basic electrical machines and measuring instruments.
		Identify the electricity bill calculations and layout representation of electrical power systems.
		Understand the operation of various basic semiconductor devices.
		Make use of the applications of semiconductor devices.
		Analyze the different digital circuits.
R23BSH-CH1102	Engineering Chemistry Lab	Determine the cell constant and conductance of solutions.
		Prepare advanced polymer materials.
		Determine the physical properties like surface tension, adsorption and viscosity.
		Estimate the viscosity index of lubricating oil.
		Calculate the hardness of water.
R23CSE-ES1102	Computer Programming Lab	Implement and execute the programs written in C language on Windows and Linux OS.
		Apply conditional and iterative statements to solve real time scenarios in C.
		Develop C programs which utilize memory efficiently through arrays and strings.
		Develop programs to demonstrate the applications through user defined datatypes.
		Construct programs using structures, unions, and files.

R23EEE-ES1102	Electrical & Electronics Engineering Workshop	Apply theoretical concepts to obtain calculations for the measurement of electrical parameters.
		Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.
		Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.
		Summarize the characteristics of various electronic devices.
		Analyze the different digital circuits.
		Evaluate the electronic devices with simulation.
R23BSH-MCI102	NSS/NCC/Scouts &Guides/ Community Service	Understand the importance of discipline, character and service motto.
		Solve some societal issues by applying acquired knowledge, facts, and techniques.
		Explore human relationships by analyzing social problems.
		Determine to extend their help for the fellow beings and downtrodden people.
		Develop leadership skills and civic responsibilities.

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DEPARTMENT OF MECHANICAL ENGINEERING

R23 Regulation Course Outcomes

I YEAR II SEMESTER		
Course Code	**Course Title**	**Course Outcomes**
R23BSH-MA1201	Differential Equations and Vector Calculus	Solve the first order ordinary differential equations related to various engineering fields.
		Solve the higher order differential equation and analyze physical situations.
		Solve partial differential equations of first order and higher related to engineering applications.
		Apply vector differential operators to the real world situations
		Estimate the work done against a field, circulation and flux using vector calculus.
R23BSH-PH1201	Engineering Physics	Analyse the intensity variation of light due to polarization, interference and diffraction.
		Identify the crystals structures with X-Ray diffraction principles.
		Classify the various types of magnetic and dielectrics materials.
		Explain the basic concepts of Quantum Mechanics and the band theory of solids.
		Recognize the type of semiconductors using Hall Effect.
R23BSH-EN1201	Communicative English	Learn how to understand the context, topic, and specific information from social or transactional dialogues.
		Learn readily to apply grammatical structures to formulate sentences and use appropriate words and correct word forms.
		Improve communicative competence in formal and informal contexts and for social and academic purposes.
		Critically comprehend and appreciate reading/listening texts and write summaries based on global comprehension of these texts.
		Write coherent paragraphs, essays, letters/emails and resumes.

R23MEC-ES1202	Basic Civil & Mechanical Engineering	Understand the disciplines of Civil Engineering and their role in development of the society.
		Apply the concepts of surveying for the measurement of distances, angles and levels
		Explain the key elements of Transportation Engineering, Water Resources and Environmental Engineering
		Identify the materials required for the specified applications.
		Illustrate the principles of basic and advanced manufacturing processes
		Explain the working principles of the Power production systems and mechanical power transmission systems.
R23MEC-PC1201	Engineering Mechanics	Understand the fundamental concepts in mechanics and determine the frictional forces for bodies in contact.
		Analyze different force systems such as concurrent non concurrent systems and calculate their resultant forces and moments.
		Calculate the centroids, center of gravity and moment of inertia of different geometrical shapes.
		Determine the displacement, velocity & acceleration relations in dynamic systems.
		Analyze the motion of the bodies with (or) without the application of force.
R23BSH-EN1202	Communicative English Lab	Understand the different aspects of the English language oral communication with emphasis on Listening and Speaking Skills.
		Apply communication skills through various language learning activities.
		Analyze the English speech sounds, stress, rhythm and intonation for better listening and speaking comprehension.
		Evaluate and exhibit professionalism in participating in debates and group discussions with polite turn-taking strategies and sound more professional while communicating with others.
		Create effective resonate and prepare them to face interviews and communicate appropriately in corporate settings.
R23BSH-PH1202	Engineering Physics Lab	Apply the working principles of laboratory experiments in optics, electrical and electronics.
		Compute the required parameter by suitable formula using experimental values (observed values) in optics, electrical and electronic experiments.
		Analyze the experimental results through graphical interpretation.
		Recognize the required precautions to carry out the experiment and handling the apparatus in the laboratory.
		Demonstrate the working principles, procedures and applications.

R23CSE-ES1201	IT workshop	Perform Hardware troubleshooting.
		Understand Hardware components and inter dependencies.
		Safeguard computer systems from viruses/worms.
		Document/ Presentation preparation.
		Perform calculations using spreadsheets.
R23MEC-ES1203	Engineering Workshop	Identify workshop tools and their operational capabilities.
		Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
		Apply fitting operations in various applications.
		Apply basic electrical engineering knowledge for House Wiring Practice
		Prepare the pipe joint with couplings for same diameter and with reduced diameters for the given application.
R23MEC-PC1202	Engineering Mechanics Lab	Evaluate the coefficient of friction between two different surfaces and between the inclined plane and the roller.
		Verify Law of Polygon of forces and Law of Moment using force polygon and bell crank lever.
		Determine the Centre of gravity and Moment of Inertia of different configurations.
		Verify the equilibrium conditions of a rigid body under the action of different force systems.
		Draw free body diagram for given force system.
R23BSH-MCI202	Health and Wellness, Yoga and Sports	Understand the importance of yoga and sports for Physical fitness and sound health.
		Demonstrate an understanding of health-related fitness components.
		Compare and contrast various activities that help enhance their health.
		Assess current personal fitness levels.
		Develop Positive Personality.

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DEPARTMENT OF MECHANICAL ENGINEERING

R23 Regulation Course Outcomes

II YEAR I SEMESTER		
Course Code	**Course Title**	**Course Outcomes**
R23BSH-MA2102	Mathematical Methods and Transform Techniques	Apply suitable numerical methods to find the roots for given equation and interpolating formula for given data.
		Apply suitable numerical methods to find the definite integral and solve real world problems when modeled into differential equations.
		Analyze the data by fitting into regression lines using least square methods.
		Apply Laplace transforms to solve the real world problems when modeled into differential equations.
		Analyze various functions using Fourier series and Fourier transforms.
R23BSH-HM2101	Understanding Harmony and Ethical Human Conduct	Implement elements and process of value education.
		Recognize thoughts, emotions and physical sensations of the self and the body and harmonizing their relationship.
		Analyze human relations and their role in ensuring harmonious society.
		Develop interconnected nature of existence encourages actions that contribute to global peace, justice and sustainability.
		Make use of humanistic constitution, mutual respect and universal human order with holistic technologies.
R23MEC-ES2101	Thermodynamics	Explain the fundamental concepts of Engineering thermodynamics
		Analyze energy balance and efficiencies for non-flow process.
		Apply the Second Law of Thermodynamics for thermal reservoirs, heat engines, refrigerators, entropy analysis, and T-ds relations.
		Apply the working principle of vapor power cycles for calculating the efficiency of a Rankine cycle
		Analyse the efficiency characteristics of thermodynamic Gas power cycles, refrigeration, and air conditioning systems.

R23MEC-PC2101	Mechanics of Solids	Apply the basic concepts of simple stresses and strains, principal stresses and strains, thermal stresses for solving the fundamental problems related to solids and structures.
		Analyze the shear force and bending moment diagrams for beams at given load conditions.
		Apply the theory of bending stresses and shear stresses for understanding the nature of the stress distributions for rectangular, circular, triangular, I and T sections.
		Analyze the deflection and stability of beams and columns under various loading and support conditions
		Apply the principles of stress, strain for thin shells and shafts for finding the stresses and strains produced in pressure vessels and torsional shear strength of the machine members.
R23MEC-PC2102	Material Science & Metallurgy	Identify the properties of metals with respect to crystal structure and grain size.
		Apply the principles of constructing binary phase diagrams to predict phase behavior and microstructural changes in materials.
		Select the appropriate heat treatment to get the desired properties of the steel component.
		Compare ferrous and nonferrous materials, related to their properties and applications, for producing mechanical components for the given specification.
		Select appropriate methods for producing metal powders based on specific applications.
R23MEC-PC2103	Mechanics of Solids & Material Science Lab	Understand the stress-strain relations of Steels, Copper, Aluminium, and other materials through tension/compression tests on UTM
		Analyze modulus of rigidity for Solid and Hollow shafts made of steel and aluminium and deflection and modulus of rigidity in leaf spring
		Analyze the impact strength of different materials.
		Identify various microstructures of steels and cast irons.
		Evaluate hardness of treated and untreated steels.
R23MEC-PC2104	Computer-Aided Machine Drawing	Interpret standard symbols and representations for various materials and machine components in technical drawings.
		Construct models of riveted, welded, and key joints using computer-aided design (CAD) software.
		Develop solid models and sectional views of machine components
		Develop Assemble Machine Parts Using Solid Modeling software
		Use CAD Software For Drawing 2-Dimensional machine Parts from The given 3-dimensional assemblies

R23CSE-SC2102	Python Programming Lab	Implement and debug simple Python programs.
		Implement Python programs with Conditionals and Loops and functions.
		Implement Python Lists, Tuples and Dictionaries for representing compound data.
		Interpret the concepts of Object-Oriented Programming as used in Python
		Apply the Module Concepts and Packages for Real Time Applications
R23BSH-MC2101	Environmental Science	Understand the significance of various natural resources, including renewable, non renewable water, minerals, forests and soil, in the environment and the problems associated with it in maintaining ecological balance and supporting human activities.
		Apply strategies for mitigating different types of environmental pollution, managing solid waste effectively and adopt individual actions that contribute to pollution prevention and waste reduction.
		Understand the structure, function, characteristic features of different kind of eco systems, value of biodiversity, threats to bio diversity and India's role and strategies in the conservation of biodiversity for sustainable development.
		Apply the Air (Prevention and Control of Pollution) Act, Water (Prevention and Control of Pollution) Act, Wildlife Protection Act, and Forest Conservation Act to promote sustainable environmental development; Address related social issues and propose effective solutions, delving into the intersection of environmental policies and community welfare to achieve ultimate sustainability goals.
		Identify the role of information technology in addressing population-related problems, focusing on resource management, environmental monitoring, urban planning, healthcare improvement, education to enhance sustainability and quality of life.

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DEPARTMENT OF MECHANICAL ENGINEERING

R23 Regulation Course Outcomes

II YEAR II SEMESTER		
Course Code	**Course Title**	**Course Outcomes**
R23BSH-HM2202	Industrial Management	Outline the functions of Management in manufacturing industries
		Develop the facility layouts as per the characteristics of the production systems.
		Select the inventory control techniques to optimize the inventory control costs
		Construct the control charts for variables and attributes for the produced parts in manufacturing sections
		Apply the concepts of CPM/PERT for Project Management.
R23BSH-MA2202	Complex Variables and Statistical Methods	Apply various theories of complex integration to solve engineering problems
		Analyze complex analytic functions using the Cauchy-Riemann equations
		Interpolate data effectively to ensure accurate representation of populations in engineering studies
		Analyze sample data effectively to ensure decision-making based on statistical inference using large sample tests.
		Analyze data statistically to derive norm-based and statistical populations insights
R23MEC-PC2201	Manufacturing Processes	Identify the most suitable casting process based on the material, complexity and application of the specified mechanical component.
		Select the most appropriate welding technique for the given engineering tasks, material type, joint configuration and required weld quality.
		Apply the principles of metal forming processes, including hot and cold working, forging, rolling, extrusion, wire drawing, and tube drawing to optimize material properties and manufacturing efficiency in industrial applications.
		Demonstrate comprehensive understanding in sheet metal forming processes, including blanking, piercing, deep drawing, stretch forming, bending, spring back management, coining, spinning, and press working operations to manufacture complex and precise components.
		Classify additive manufacturing processes based on their operational principles, considering mechanical properties, compatibility and specific requirements.

R23MEC-PC2202	Fluid Mechanics & Hydraulic Machines	Apply the principles of fluid statics and buoyancy to assess fluid behavior and stability of submerged bodies.
		Apply the principles of fluid kinematics and dynamics to analyze flow types and solve practical problems in closed conduit flow.
		Analyze principles of boundary layer theory and dimensional analysis to understand fluid flow around different bodies, predict separation phenomena, and implement effective control mechanisms.
		Apply the principles of turbo machinery and hydraulic turbines to evaluate their operational characteristics, efficiencies, and hydraulic designs.
		Analyze the performance of hydraulic turbines, centrifugal pumps, and reciprocating pumps, emphasizing efficiency, operational characteristics, and factors such as cavitation and NPSH.
R23MEC-PC2203	Kinematics of Machinery	Design the complex mechanical systems from the fundamental principles of kinematics and dynamics of machines.
		Apply the knowledge of various mechanical linkages and steering gear mechanisms in practical engineering scenarios.
		Apply the relative velocity method for four-bar chains and other common mechanisms, the theories involved in cams, applications of cams and their working principles.
		Design gears, power transmission through different types of gears and gear trains.
		Apply theoretical and practical knowledge to design efficient and effective belt drive systems.
R23MEC-PC2204	Fluid Mechanics & Hydraulic Machinery Lab	Conduct experiments on hydraulic machinery and flow measurement devices to apply principles of fluid mechanics practically.
		Evaluate performance characteristics and efficiencies of hydraulic turbines, pumps, and flow meters based on experimental results.
		Demonstrate proficiency in performing tests and calibrations of hydraulic machinery and flow meters.
		Assess the impact of design parameters on hydraulic machinery and flow meters using experimental data to inform operational decisions.
		Interpret experimental findings to guide selection, operation, and maintenance of hydraulic systems and flow measurement devices effectively.
R23MEC-PC2205	Manufacturing Processes Lab	Prepare a pattern with appropriate allowances to make required casting.
		Apply the principles of injection molding and blow molding to produce high-quality plastic components.
		Demonstrate the proficiency in all welding techniques, gas cutting techniques and sheet metal operations.
		Apply principles of 3D printing technology to set up and operate 3D printer to produce the part with given specifications.
		Demonstrate the stages in the manufacturing process with virtual labs for a given specification of parts.

R23BSH-SC2101	English for Employability Skills	Enable students to identify Parts of Speech and use them flawlessly, write Emails in formal correspondence effectively, participate confidently by introducing oneself in any formal discussion.
		Attain Language Proficiency & Accuracy through Contextualized Vocabulary, Verb forms, Tense and subject-verb agreement, produce coherent expressions for professional writing, and introduce themselves unhesitatingly with Task-Based Activities.
		Develop the fluency and accuracy to write Technical Reports and Emails for professional communication by using appropriate vocabulary and participate in confidently in formal discussions.
		Assimilate lifelong reading habits to comprehend a passage for its gist. Avoid errors in both Speech & Writing and write Letters and Emails for official communication.
		Realise the technical communicative competence and attainment of grammatical correctness for formal communication.
R23MEC-ES2201	Design Thinking & Innovation	Develop mind maps, empathy maps and journey maps for the design thinking process.
		Develop mockup models through ideation and innovation techniques
		Evaluate diverse methods employed in design thinking and establish a workable design thinking framework to use in their practices.
		Analyze the methodology and present ideas clearly and coherently to specific audience in both the written and oral forms.
		Create fabricated / virtual prototype model.

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