



Estd. 2004

Lakshmi Narain College of Technology, Indore

Bhawrasala, Behind SAIMS Hospital, Sanwer Road, Indore, Madhya Pradesh, 453331

Phone: 0731-425 31 25 | +91 97 524 108 47

Email: admission@lctindore.com

Branch: B. Tech (Automobile Engineering)

Programme Educational Objectives (PEOs)

- Graduate shall pursue successful career in automotive and ancillary industry, in the domain of design, testing and diagnostics that meet the needs of global companies.
- Graduate shall lay solid foundation of automotive engineering and engineering in general; in order to pursue higher education/certifications and research interests.
- Graduate shall generate employment by being an entrepreneur.
- Graduate shall serve in public/private transport organization and offer services in sectors like insurance, sales & marketing etc.
- Graduate shall contribute to the society in general by becoming professional engineer and responsible citizen of the nation.

Programme Outcomes (POs)

- Apply mathematics, science, engineering fundamentals and an engineering specialization to the conceptualization of engineering models
- Identify, formulate, research literature and solve complex engineering problems reaching substantiated conclusions using first principles of mathematics and engineering sciences
- Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations
- Conduct investigations of complex problems including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions
- Create, select and apply appropriate techniques, resources, and modern engineering tools, including prediction and modeling, to complex engineering activities, with an understanding of the limitations.

- Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings
- 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.
- Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering practice
- Understand and commit to professional ethics and responsibilities and norms of engineering practice
- Understand the impact of engineering solutions in a societal context and demonstrate knowledge of and need for sustainable development
- Demonstrate a knowledge and understanding of management and business practices, such as risk and change management, and understand their limitations
- Recognize the need for, and have the ability to engage in independent and life-long learning
- Demonstrate a knowledge and understanding of contemporary technologies, their applications and limitations, contemporary research in the broader context of relevant fields.
- Demonstrate the ability to succeed in national and international competitive events in the relevant fields.

Course Outcomes (Cos)	
NAME OF SUBJECT: Mathematics	
SUBJECT CODE: BT 301	
Students will be able to	
CO 1	Demonstrate familiarity with emerging mathematical techniques appropriate in industries and other institutions.
CO 2	To develop logical understanding of the subject. from Engineering fields make aware students about the importance and symbiosis between Mathematics and Engineering.
CO 3	The connections between the mathematical series and other scientific and humoristic disciplines.
CO 4	The principles of mathematical reasoning and their use in understanding analyzing and developing formal arguments.
CO 5	To develop mathematical skill so that students are able to apply mathematical methods & principals in solving problem

NAME OF SUBJECT: Thermodynamics	
SUBJECT CODE: AU 302	
Students will be able to	
CO 1	Use thermodynamic terminology correctly
CO 2	Explain fundamental thermodynamic properties.
CO 3	Derive and discuss the first and second laws of thermodynamics..
CO 4	Solve problems using the properties and relationships of thermodynamic fluids.
CO 5	Analyze basic thermodynamic cycles.

NAME OF SUBJECT: Materials Technology	
SUBJECT CODE: AU 303	
Students will be able to	
CO 1	Do materials selection for specific applications,
CO 2	Describe microstructures and corresponding properties for selected materials,
CO 3	Solve basic engineering problems related to materials selection and components
CO 4	Acknowledge the importance of surface modification and study the different surface modification methods.
CO 5	Perceive the basics of Powder metallurgy and application of powder metallurgy
CO 6	Select proper metal, alloys, nonmetal and powder metallurgical component for specific application requirement.

NAME OF SUBJECT: Strength of Material	
SUBJECT CODE: AU 304	
Students will be able to	
CO 1	Predict mechanical behavior of the member by determining the stresses, strains and deflections produced by the load up to the elastic limit.
CO 2	Solve the stresses in determinate and indeterminate, homogeneous and composite bar under concentrated loads, self weight and thermal loads.
CO 3	Construct Shear Force and Bending Moment diagrams for statically determinate beam due to concentrated load, uniformly distributed load, uniformly varying load and couple.
CO 4	Determine bending and shear stresses in machine elements
CO 5	Evaluate Slope and Deflection of Statically Determinate beams subjected to concentrated load, uniformly distributed load, uniformly varying load and couple and also strain energy in member subjected to Gradual, sudden and impact loads
CO 6	Estimate stresses, strain and deformations in indeterminate shafts of solid and hollow, homogeneous and composite circular cross-section subjected to twisting moment also critical load of columns under various end conditions.
CO 7	Design the components subjected to various loadings with the help of various theories of failures.
CO 8	Design component to meet desired needs with in realistic constraints of health and safety.

NAME OF SUBJECT: Manufacturing Process	
SUBJECT CODE: AU 305	
Students will be able to	
CO 1	Select appropriate Manufacturing Processing to manufacture any component.
CO 2	Interpret foundry practices like pattern making, mold making Core making and Inspection of defects.
CO 3	Classify different plastic molding processes, Extrusion of Plastic and Thermoforming.
CO 4	Select appropriate Joining Processes to join Work piece.

CO 5	Design different sheet metal working processes.
CO 6	Demonstrate operation such as Turning, Facing, Threading, Knurling and Grooving on Centre Lathe.
CO 7	Implement the Knowledge of Gained Subject in Industry.

NAME OF SUBJECT: Thermal Engineering Lab	
SUBJECT CODE: AU 306	
Students will be able to	
CO 1	Estimation of uncertainty in experiments and the so obtained results.
CO 2	Exposure to inverse heat conduction technique.
CO 3	Identify the various fuel characterizations through experimental testing.
CO 4	Analyze the performance characteristics of an internal combustion engines
CO 5	Analyze the air compressor characteristics

NAME OF SUBJECT: Energy & Environmental Engineering	
SUBJECT CODE: ES 401	
Students will be able to	
CO 1	Estimate the population - economic growth, energy requirement and demand.
CO 2	Identify environmental problems arising due to engineering and technological activities and the science behind those problem.
CO 3	Analyze material balance for different environmental systems.
CO 4	Realize the importance of ecosystem and biodiversity for maintaining ecological balance.
CO 5	Identify the major pollutants and abatement devices for environmental management and sustainable development.

NAME OF SUBJECT: Instrumentation & Control	
SUBJECT CODE: AU 402	
Students will be able to	
CO 1	Define and explain various fundamentals of spectroscopy, qualitative and quantitative analysis.
CO 2	Discuss the terms, principle, instrumentation, operation and applications of Molecular spectroscopic techniques.
CO 3	Differentiate between principle, instrumentation and operation of Atomic absorption and emission Spectroscopy.
CO 4	Explain the various Separation techniques and its instrumentation.
CO 5	Describe the principle and working of various Radiation detectors.
CO 6	Discuss the principle and working of various Gas analyzers.
CO 7	Handle different types of controller like electronic, pneumatic and hydraulic.
CO 8	Understand batch process with an example.

NAME OF SUBJECT: Theory of Machines	
SUBJECT CODE: AU 403	
Students will be able to	
CO 1	Theory of Machines study of velocity, acceleration and force analysis of different mechanisms, power transmitting elements.
CO 2	Conversant with commonly used mechanism for industrial application.
CO 3	The students will get competency in drawing velocity and acceleration diagram for simple and complex mechanism.
CO 4	Students will get analytical competency in solving kinematic problems using complex algebra method.
CO 5	The students will get competency in graphical and analytical method for solving problems.

NAME OF SUBJECT: Fluid Mechanics	
SUBJECT CODE: AU 404	
Students will be able to	
CO 1	Describe the physical properties of a fluid.
CO 2	Calculate the pressure distribution for incompressible fluids.
CO 3	Calculate the hydrostatic pressure and force on plane and curved surfaces.
CO 4	Demonstrate the application point of hydrostatic forces on plane and curved surfaces.
CO 5	Describe the motion of fluids..
CO 6	Identify derivation of basic equations of fluid mechanics and apply
CO 7	Make dimensional analysis and similitude.
CO 8	Apply the similitude concept and set up the relation between a model and a prototype.

NAME OF SUBJECT: Manufacturing Technology	
SUBJECT CODE: AU 405	
Students will be able to	
CO 1	Choose machining processing to manufacture any component
CO 2	Estimate machining time for milling and drilling process.
CO 3	Understand finishing processes
CO 4	Calculate forces during orthogo0l metal cutting.
CO 5	Explain principle and applications of advanced machining processes
CO 6	Develop part program for turning.
CO 7	Design jig Sand fixture for given component
CO 8	Implement the knowledge of machining processes in Manufacturing Industries.

NAME OF SUBJECT: Software Lab.	
SUBJECT CODE: AU 406	
Students will be able to	
CO 1	Simulate simple problems in vibrations and simple mechanisms using simulation software.
CO 2	Perform analysis of stress, truss/beam and dynamic analysis of mechanical members.
CO 3	Perform two dimensional stress analysis in plate and asymmetric shells
CO 4	Analyze the temperature distribution in one dimensional heat transfer problems (walls and fins)

NAME OF SUBJECT: Automotive Engine	
SUBJECT CODE: AU 501	
Students will be able to	
CO1	Classify various types of Engines, to compare Air standard, Fuel Air and Actual cycles Also make out various losses in real cycles.
CO2	Understand Theory of Carburetion, Types of carburetors, Modern Carburetor.
CO3	To understand the main theory behind Internal Combustion Engine along with the understanding of all the components and systems used in the automotive systems and carry out the performance and emission in IC Engines. To understand Stages of Combustion in S. I. Engines and Theory of Detonation, Pre-ignition and factors affecting detonation.

NAME OF SUBJECT: Automotive chassis system	
SUBJECT CODE: AU 502	
Students will be able to	
CO1	To introduce the basics, working principle and construction of all the Automobile Chassis Components.
CO2	Classify the chassis layout with reference to the power-train location and design of steering system for proper rolling of the tyres.
CO3	Explain the different components in the drive line and understand the details of differential unit.
CO4	Summarize the different types of rear axles and to understand the need for suspension systems and its types.
CO5	Explain the various braking systems and in which circumstances each one of them is used.
CO6	At the end of the course, the students will be familiar with the fundamentals of Automobile Chassis Components

NAME OF SUBJECT: Automotive Transmission system	
SUBJECT CODE: AU 503 (A)	
Students will be able to	
CO1	The student will understand the principle and working of the clutch, gearbox
CO2	The student will understand the principle and working of the Torque Converters
CO3	The student will know about the Automatic Transmission and Applications of Automatic Transmission
CO4	The student will understand the principle and working of the Hydro-Static Drive and Electric Drives

CO5	The student will know about the clutch, gearbox, hydrodynamic drives, automatic transmission, hydrostatic drive and electric drive in automobiles, their principle of operation and performance
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NAME OF SUBJECT: Entrepreneurship & Management	
SUBJECT CODE: AU 504 (A)	
Students will be able to	
CO1	Understand and explain the key terms, definitions, and concepts used in Entrepreneurship Development
CO2	Apply the techniques of environmental analysis, opportunity assessment, feasibility study and generating business ideas
CO3	Construct a well-structured business plan by including all the necessary elements of the business plan
CO4	Plan a start up by applying the knowledge of sources of finance and the supporting schemes offered by state and central governments and other entrepreneurial development organizations

NAME OF SUBJECT: Two Wheeler & Four wheeler	
SUBJECT CODE: AU 601	
Students will be able to	
CO1	The course is designed to understand different types of two and three wheelers types, construction and working
CO2	Students will also be able to learn about different functions of two and three wheeler
CO3	Learning of maintenance of two and three wheelers

NAME OF SUBJECT: Machine Component Design	
SUBJECT CODE:AU 602	
Students will be able to	
CO1	Select standard items and preferred numbers for designing simple machine elements
CO2	Calculate resisting area of simple machine element subjected to direct independent stress
CO3	state modulus of various sections subjected to pure bending like levers, beams and axles
CO4	Calculate numerical on the design procedure of machine elements subjected to twisting moment.

NAME OF SUBJECT: Automotive Electrical & electronic	
SUBJECT CODE: AU 603 (A)	
Students will be able to	
CO1	Enumerate the construction, characteristics and maintenance of battery, lighting system and different accessories in a typical automobile after careful inspection.
CO2	Explain the construction, characteristics and maintenance of starting and ignition system and diagnose the ignition system fault of any vehicle.
CO3	List out the principles and characteristics of charging system components and demonstrate their working with suitable tools.
CO4	Describe the principles and architecture of electronics systems and its components present in an automobile related to instrumentation, control, security and warning systems

NAME OF SUBJECT: Renewable Energy Technology	
SUBJECT CODE: AU 604 (C)	
Students will be able to	
CO1	Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations
CO2	Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations
CO3	Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications
CO4	Understand the concept of Biomass energy resources and their classification, types of biogas Plant.

NAME OF SUBJECT: Mechanical Vibration	
SUBJECT CODE: AU 701	
Students will be able to	
CO1	Study of vibration. Basically in this subject students will undergone through, the causes of vibration in the machines. And how to control it. Also they are come to know analytical relationships and using this relationships, students will able to analyse the dynamic conditions of the machine and its components. In addition to this students can able to know, the noise measurement of machine and its components.
CO2	Students will be able to determine the unbalance in rotating & reciprocating machines and to determine the correction required.
CO3	Student Should be able to understand the concept of Single DOF free and force vibrations to various system.
CO4	Students will be able to model and analyze simple, two degrees of freedom vibration systems.
CO5	Students will be able to measure the vibration using methods

NAME OF SUBJECT: Heat and Mass Transfer	
SUBJECT CODE: AU 702(B)	
Students will be able to	
CO1	Analyze steady & unsteady heat transfer in composite systems with & without heat generation and extended surfaces.
CO2	Calculate free and force convection heat transfer in external and internal flows.
CO3	Describe film wise & drop wise condensation, pool & flow boiling and analyze heat exchanger using LMTD and NTU approaches.
CO4	Analyze radiation heat transfer between surfaces using shape factor algebra.
CO5	Analyze diffusion and convective mass transfer occurring in different applications.

NAME OF SUBJECT: Ergonomics	
SUBJECT CODE: AU 703 (C)	
Students will be able to	
CO1	Explain the psychology of human behavior as it relates to workplace safety. .
CO2	Identify ergonomic hazards; recommend appropriate controls.
CO3	Relate the human and workplace factors which contribute to ergonomic hazards
CO4	Explain the psychology of human behavior as it relates to workplace safety;
CO5	Identify ergonomic hazards; recommend appropriate controls, and relate the human and workplace factors which contribute to ergonomic hazard

NAME OF SUBJECT: Automotive Electrical & electronic LAB	
SUBJECT CODE: AU 704	
Students will be able to	
CO1	Enumerate the construction, characteristics and maintenance of battery, lighting system and different accessories in a typical automobile after careful inspection.
CO2	Explain the construction, characteristics and maintenance of starting and ignition system and diagnose the ignition system fault of any vehicle.
CO3	List out the principles and characteristics of charging system components and demonstrate their working with suitable tools.
CO4	Describe the principles and architecture of electronics systems and its components present in an automobile related to instrumentation, control, security and warning systems
CO5	Enumerate the principles, application, construction and specification of different sensors and actuators usable in typical automobile by suitable testing

NAME OF SUBJECT: Automotive Transmission lab	
SUBJECT CODE: AU 705	
Students will be able to	
CO1	The student will understand the principle and working of the clutch, gearbox
CO2	The student will understand the principle and working of the Torque Converters
CO3	The student will know about the Automatic Transmission and Applications of Automatic Transmission
CO4	The student will understand the principle and working of the Hydro-Static Drive and Electric Drives
CO5	The student will know about the clutch, gearbox, hydrodynamic drives, automatic transmission, hydrostatic drive and electric drive in automobiles, their principle of operation and performance

NAME OF SUBJECT: Minor Project	
SUBJECT CODE: AU 706	
Students will be able to	
CO1	Develop the ability to solve a specific problem right from its identification and Literature review till the successful solution of the same.

NAME OF SUBJECT: Vehicle Dynamic	
SUBJECT CODE: AU 801	
Students will be able to	
CO1	To present a problem oriented in depth knowledge of Vehicle Dynamics. To address the underlying concepts and methods behind Vehicle Dynamics
CO2	The student can identify different areas of Vehicle Dynamics. Can find the applications of all the areas in day to day life
CO3	To understand the principle and performance of vehicle in various modes such as longitudinal, vertical and lateral directions. At the end of the course the student will be able to identify the various forces and loads and performance under acceleration, ride and braking

NAME OF SUBJECT: Refrigeration & Air conditioning	
SUBJECT CODE: AU 802(A)	
Students will be able to	
CO1	Students will demonstrate an ability to analysis psychometric processes and cycles of air conditioning systems.
CO2	Students will demonstrate an ability to estimate the energy requirements of cooling and heat equipment for simple air conditioning applications
CO3	Students will show an ability to apply the HVAC theory to design a HVAC system.
CO4	Understand fundamental concepts of a special topic in computational mathematics and its role in modern mathematics and applied contexts..
CO5	Student will show an ability to prepare an effective engineering report. Student will make an oral presentation of the HVAC design project.

NAME OF SUBJECT: Battery Management System	
SUBJECT CODE: AU 803(C)	
Students will be able to	
CO1	The ongoing transformation of battery technology has prompted many newcomers to learn about designing battery management systems. This course provides a beginner's guide to the battery management system (BMS) architecture, discusses the major functional blocks and explains the importance of each block to the battery management system.
CO2	In this course, we'll take a look at Battery Management Systems and look at what a battery management system is, what it does and we'll also explore the individual components that typically make up a battery management system.
CO3	A battery management system is essentially the "brain" of a battery pack; it measures and reports crucial information for the operation of the battery and also also protects the battery from damage in a wide range of operating conditions
CO4	Battery management systems for certain applications like the one for this hand-held point-of- sales terminal also include an embedded charger consisting of a control device, an inductor (which is an energy storage device), and a discharger. The control device manages the charging algorithm. For lithium-ion cells, the ideal charging algorithm is constant current and

constant voltage

NAME OF SUBJECT: Fault diagnosis and Trouble Shooting	
SUBJECT CODE: AU 804	
Students will be able to	
CO1	Early fault diagnosis for automobile engines is very important to ensure reliable operation of the engine.
CO2	Detecting faults and its' location, without dismantling the engine is Studied in this subject .
CO3	OBD method cannot be used for old vehicles. Hence, these factors necessitate the development of intelligent and accurate diagnosis method for troubleshooting automobile engine faults.
CO4	On-board diagnostic (OBD) systems in modern vehicles can be used to detect engine faults up to some extent is studied in this subject

NAME OF SUBJECT: Major Project	
SUBJECT CODE: AU 805	
Students will be able to	
CO1	Develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.