K L UNIVERSITY
DEPARTMENT OF MECHANICAL ENGINEERING
2015-2019 BATCH Course Outcomes (COs)

S NO	Course Code	Course Title	CO NO	Description of the Course Outcome
1	15EN1101	RUDIMENTS OF COMMUNICATION SKILLS	CO1	Remember speech sounds and apply stress and intonation rules to enhance pronunciation skills
			CO2	Understand writing strategies and apply those by using the basic and advanced concepts of grammar
			CO3	Understand the types of texts and tone of the author.
			CO4	Understand the importance of interpersonal skills
2	15MT1001	SINGLE VARIABLE CALCULUS AND MATRIX ALGEBRA	CO1	Model physical laws and relations mathematically as a first order differential equations, solve by an appropriate method and interpret the solution.
			CO2	Model physical laws and relations mathematically as a second/higher order differential equations, solve by an appropriate method and interpret the solution.
			CO3	Obtain the Fourier series expansions of periodic functions and use the series to solve differential equations.
			CO4	Model physical problems mathematically as a system of linear equations and solve them by analytical and numerical methods. Also, determine the nature of Quadratic form using Eigen values
			CO5	Verify the solution of problems through MATLAB.
3	15PH1001	ENGINEERING MATERIALS	CO1	Understands structure of crystalline solids, kinds of crystal imperfections and appreciates structure-property relationship in crystals.
			CO2	Understands the role of electronic energy band structures of solids in governing various electrical and optical properties of materials.
			CO3	Understands role of molecular vibrations in determining thermal properties of materials and deformation of materials in response to action of load, for identification of materials having specific engineering applications.
			CO4	Understands spin and orbital motion of electrons in determining magnetic properties of materials and identifies their role in classification soft & hard magnetic materials having specific engineering applications.
			CO5	Apply the knowledge on structure and properties of materials while executing related experiments and develop some inter disciplinary projects.
4	15CS1001	C PROGRAMMING AND DATA STRUCTURES	CO1	Illustrate how problems are solved using computers and programming.
			CO2	Interpret & Illustrate user defined C functions and different operations on list of data.
			CO3	Implement Linear Data Structures and compare them.
			CO4	Implement Binary Trees.
			CO5	Apply the knowledge obtained by the course to solve real world problems.
5	15GN1002	HUMAN VALUES	CO1	realize and understand the basic aspiration, harmony in the human being.
			CO2	envisage the roadmap to fulfill the basic aspiration of human beings.
			CO3	analyze the profession and his role in this existence.
6	15GN1004	INTRODUCTION TO ENGINEERING	CO1	Understand the basic principles of engineering design
			CO2	Understand and analyze the possible career options in Engineering and develop strategic plan, career targets and mechanism to achieve the same.
			CO3	Understand the aspects of critical thinking and problem solving in engineering
			CO4	Apply to knowledge of critical thinking to frame real-world problems and provide basic solution approach to such problems from engineering perspective
7	15ME1002	ENGINEERING GRAPHICS	CO1	Draft Orthographic views, projections of planes and , solidsmanually and by using CAD software Tool (AutoCAD)
			CO2	Drafting Sectional views , Isometric views ,development of surfaces and perspectives views manually and by using AutoCAD
			CO3	Project based workshop to prepare different models with the aid of workshop trades i.e., Carpentry, Tin smithy, House wiring and Fitting
8	15EN1202	INTER PERSONAL COMMUNICATION SKILLS	CO1	Understand the method of identifying the meaning of words and apply them in contexts.
			CO2	Understand and analyze different cultures and the importance of empathy in cross-cultural communication.
			CO3	Understand and analyze seven techniques of reading and improve reading speed.
			CO4	Understand and apply writing strategies in office/ formal communication
9	15MT1203	MULTIVARIATE CALCULUS	CO1	Determine extreme values for functions of several variables
			CO2	Determine area, volume through multiples integrals
			CO3	Apply the concepts of vector calculus to calculate the gradient, directional derivative, arc length , areas of surfaces and volume of solids in practical problems
			CO4	Obtain analytical and numerical solutions of Heat and wave equations
			CO5	Verify the solution of problems through MATLAB
10	15CY1001	ENGINEERING CHEMISTRY	CO1	Examine water quality and select appropriate purification technique for intended problem
			CO2	Predict potential complications from combining various chemicals or metals in an engineering setting
			CO3	Discuss fundamental aspects of electrochemistry and materials science relevant to corrosion phenomena
			CO4	Apply phase rule, polymers, conducting polymers and nano chemistry to engineering processes
			CO5	An ability to analyze & generate experimental skills
11	15ME1001	MECHANICS	CO1	Understand the concept of forces and apply the static equilibrium equations.
			CO2	Analyze co-planar and non co-planar system of forces.
			CO3	Apply the concept of centroid & centre of gravity to determine moment of inertia.
			CO4	Analyze the rigid bodies under translation and rotation with and without considering forces.

S NO	Course Code	Course Title	CO NO	Description of the Course Outcome
			CO5	Understand the engineering systems to prepare and demonstrate the models with the help of mechanics concept to solve the engineering problems.
12	15BT1001	BIOLOGY FOR ENGINEERS	CO1	Understand the basis of Life, Living organisms and human body systems
			CO2	Understand the importance of Diet and Nutrition
			CO3	Acquire the knowledge of beneficial and harmful Microorganisms and Biosensors
13	15ME2207	GRAPHICS AND VISUALIZATION OF MECHANICAL COMPONENTS	CO1	Communicate information about various mechanical components visually
			CO2	Sketch shaft coupling and pipe joints
			CO3	Develop assembly and part drawings
			CO4	Analyze and visualization of various mechanical joints and mechanisms.
			CO5	Implement computer aided drafting and simulation
14	15GN1001	ECOLOGY AND ENVIRONMENT	CO1	Understand the importance of Environmental education and conservation of natural resources
			CO2	Understand the importance of ecosystems and biodiversity.
			CO3	Understand the knowledge on solid waste management,disaster management and EIA process
15	15GN1003	MEASURMENTS	CO1	Understand and apply the fundamentals of a measurement system, characteristics, transducers and metrology using simulation and experimentation tools.
			CO2	Understand various electrical & computer parameters, and apply different measuring techniques on various electrical parameters using simulation and experimentation tools.
			CO3	Understand electronic & electro-physiological parameters, and apply measuring techniques on electronic parameters using simulation and experimentation tools.
			CO4	Understand and apply different measuring techniques on civil and mechanical parameters using simulation and experimentation tools.
16	15ME1003	THERMODYNAMICS	CO1	Understand the fundamentals of thermodynamic systems and processes
			CO2	Apply laws of the thermodynamics and principle of entropy to engineering devices.
			CO3	Analyze various air standard cycles and their performance.
			CO4	Evaluate the performance of fuels and combustion to various engines.
			CO5	Apply the theoretical concepts to conduct various experiments of thermodynamics practically and analyze the data.
17	15ME2104	FLUID MECHANICS	CO1	Understand various properties of fluids and apply various laws for measuring pressure
			CO2	Apply the laws to measure total pressure and center of pressure on surfaces and understand the concepts of Buoyancy and flotation
			CO3	Apply continuity equation, stream function and velocity potential function for fluid flows and apply Bernoulli's equation to various fluid flow applications
			CO4	Estimate the major and minor losses in flow through pipes and understand the concepts of dimensional analysis and boundary layers.
			CO5	Apply the theoretical concepts to conduct various experiments of fluid flow practically and analyze the data.
18	15ME2106	STRENGTH OF MATERIALS	CO1	Analyze stresses in members with 1D axial loading or torsion
			CO2	Analyze shear force and bending moment diagrams
			CO3	Analyze deflections and stresses in beams
			CO4	Design columns and pressure vessels
			CO5	Apply the theoretical concepts to conduct various experiments of strength of materials practically and analyze the data
19	15 EN 2103	PROFESSIONAL COMMUNICATION SKILLS	CO1	Apply the various strategies of presentation Skills.
			CO2	Analyze the given topics and situations and applying the strategies of group discussion.
			CO3	Analyze the basic concepts of critical and analytical reading skills.
			CO4	Apply the strategies of sentence formation and sentence completion.
20	15MT2104	PROBABILITY AND OPTIMIZATION TECHNIQUES	CO1	Demonstrate Probability, theorems of probability and their applications in discrete probability distributions to the real world problems.
			CO2	Apply Continuous distributions to analyze various real-world situations and also Construct the linear and non-linear regression lines.
			CO3	Determine the relationship between two variables for grouped and ungrouped data using correlation coefficient and also Formulate the given industrial problems as a linear programming problem and solve it by graphical method
			CO4	Obtain the solutions of linear and non-linear programming problems using different methods
			CO5	Verify the solution of the problems through MATLAB/Excel
21	15ES2002	SIGNAL ANALYSIS	CO1	Understand the representation, manipulation and operations of continous Time signals and Systems
			CO2	Explore the continous Time signals in Fourier domain and illustration of sampling theorem
			CO3	Understand the Laplace transforms and its applications in LTI Systems
			CO4	Analyze Discrete time signals in Fourier and Z Transform domain
			CO5	Apply and evaluate signals and systems concept to various applications under time domain and transform domain
22	15ME2105	MATERIALS SCIENCE AND METALLURGY	CO1	Identify and differentiate various types of materials. i.e. Metals, Alloys and understand various material testing methods.
			CO2	Analyze the concept of cooling curves, equilibrium phase diagrams, and heat treatment techniques.
			CO3	Identify the importance of composites, ceramics and strengthening mechanisms.
			CO4	Identify various nano material, bio-material, smart material and powder metallurgy process and their applications.
			CO1	Understand the principles, applications, and limitations of Sand Casting.
			CO2	Understand the principles, applications, and limitations of Special Casting , Forming, and Forging processes.

S NO	Course Code	Course Title	CO NO	Description of the Course Outcome
23	15ME2208	MANUFACTURING SCIENCE AND TECHNOLOGY	CO3	Understand the principles, applications, and limitations of joining processes and machining w.r.t turning, drilling
			CO4	Understand the principle, applications, and limitations of machining w.r.t milling and grinding. Understand the principles of the design and use of jigs and fixtures.
			CO5	Gain hands on experience in converting a given raw material into desired shape and size by applying suitable primary and /or secondary manufacturing processes
24	15ME2209	KINEMATICS AND DYNAMICS OF MACHINES	CO1	Identify, select and analyze kinematically suitable mechanisms for required motion of machinery
			CO2	Develop velocity and acceleration diagrams and analyze the data
			CO3	Develop cam profiles and Analyze gears and gear trains kinematically
			CO4	Analyze mechanisms dynamically
			CO5	Apply the theoretical concepts to design mechanisms by using the simulation software and analyzing the data
25	15ME2210	APPLIED THERMODYNAMICS	CO1	Understand the properties of Pure substances and analyze the Rankine cycle efficiency
			CO2	Apply the principles of nozzle and understand the working of Condensers
			CO3	Understand fundamentals of I.C engines and combustion
			CO4	Apply the principles of Refrigeration and Psychrometry to refrigeration and air conditioning units
			CO5	Able to do design a power plant , air conditioning unit and a refrigeration plant
26	15 EE 2202	BASIC ELECTRICAL & ELECTRONICS ENGINEERING	CO1	Understand basics of DC circuit analysis, fundamentals of AC and introduction three phase circuits
			CO2	Understand construction & working principle of DC Machines
			CO3	Understand construction & working principle of Transformer, three phase and single phase induction motor.
			CO4	Understand number systems and their conversions, characteristics of PN junction diode
			CO5	Conduct an experiment to analyze the performance of various electrical and electronic devices and draw their char characteristics.
27	15ME3111	FINITE ELEMENT METHOD	CO1	Analyse and evaluate 1D problems and plane trusses using FEM
			CO2	Analyse and evaluate 2D problems using FEM
			CO3	Analyse and evaluate axisymmetric solids subjected to axisymmetric loading using FEM
			CO4	Analyze and evaluate solids subjected to dynamic loads
			CO5	Apply the theoretical concepts to conduct various interpretation by using Analysis software's
28	15ME3112	DESIGN OF MACHINE ELEMENTS	CO1	Design of machine elements for simple and combined static stresses, fatigue strength
			CO2	Design shaft and couplings under static and dynamic loads, Flywheel
			CO3	Design of Power screws, bolted and welded joints and springs.
			CO4	Design of bolted and welded joints and springs
			CO5	Apply the theoretical concepts to conduct various experiments on design of machine elements practically and analyze the data.
29	15ME3113	ADVANCED MANUFACTURING TECHNOLOGY	CO1	Implement various modern and advanced manufacturing techniques and processes
			CO2	Analyze the parameters related to economics of machining
			CO3	Understand NC, DNC and CNC systems
			CO4	Identify various techniques for processing of MEMS
			CO5	Apply the theoretical concepts to conduct various experiments on Unconventional machines
30	15ME3114	TURBO MACHINES	CO1	Design of rotor systems
			CO2	Design of compressor and fan blades
			CO3	Design of pumps
			CO4	Design of turbines
			CO5	Apply the theoretical concepts to conduct various experiments practically and analyze the data.
31	15ME3115	FEEDBACK AND CONTROL SYSTEMS	CO1	Acquire ability to analyze, evaluate and simulate time response of a Mechatronic system
			CO2	Understand Quantizing theory and Data acquisition systems
			CO3	Understand the role of PLCs and microcontrollers in the design of control systems for mechatronic systems to achieve desired performance characteristics
			CO4	Acquire ability to analyze, evaluate and improve system performance using the control strategies viz. P, PD, PI, PID etc.
			CO5	Modelling of mechanical, hydraulic/ pneumatic and thermal systems using NI LabVIEW Software
32	15 ME 3216	DESIGN OF TRANSMISSION ELEMENTS	CO1	Design and select suitable bearings for applications
			CO2	Design brakes and clutches for given conditions
			CO3	Design gears and belt and chain drives for power transmission
			CO4	Design of IC engine components - piston, connecting rod and crankshaft.
			CO5	Apply the theoretical concepts to conduct various Simulations by using the simulation tool and analyze the data
33	15 ME 3217	PRODUCTION AND OPERATIONS MANAGEMENT	CO1	Apply techniques to improve productivity and quality in production system
			CO2	Apply the principles of layout design, line balancing, Forecasting
			CO3	Apply the principles of Aggregates planning, Inventory management in operations management
			CO4	Inspection & Quality control
			CO5	Apply the theoretical concepts to conduct various experiments practically and analyze the data.
34	15 ME 3218	HEAT TRANSFER	CO1	Understanding basic principles of conduction, radiation, and convection heat transfer.
			CO2	Extend the basic principle of conservation of energy to systems which involve conduction, radiation, and heat transfer.
			CO3	To identify, formulate and solve engineering problems involving conduction convection and radiation heat transfer.

S NO	Course Code	Course Title	CO NO	Description of the Course Outcome
34	15 ME 3218	HEAT TRANSFER	CO4	To identify, formulate and solve engineering problems involving conduction convection and radiation heat transfer into a mathematical model, selecting an appropriate solution technique and evaluating the significance of results.
			CO5	Apply the theoretical concepts to conduct various experiments of heat transfer practically and analyze the data. b 2
35	15 ME 3251	AUTOMOBILE ENGINEERING	CO1	Understand cooling and lubrication systems
			CO2	Understand chassis and emission of automobiles
			CO3	Know the transmission and suspension systems
			CO4	Analyze the performance of transmission and suspension systems
36	15 ME 4155	AUTOMOBILE ENGINE DESIGN	CO1	Understand and design of engine from first principle
			CO2	Design and Analyze cooling, lubrication and engine component systems
			CO3	Design engine components
			CO4	Understand engine testing equipments
37	15 ME 4156	AUTOMOTIVE TRANSMISSION	CO1	Understand functionality of clutches and gear box
			CO2	Principle of working of drive line systems
			CO3	Understand transmission of fluid flywheel and torque convertor
			CO4	Principle of working of automatic transmission systems
38	15 ME 4157	AUTOTRONICS & SAFETY	CO1	Understand working principles of different batteries and ignition system
			CO2	Understand working principles of ignition system
			CO3	Understand auto wiring electrical systems
			CO4	Understand safety concept and safety equipments
39	15 ME4158	ALTERNATIVE ENERGY SOURCES FOR AUTOMOBILES	CO1	Application of solar photo voltaic cells
			CO2	Understand Hydrogen energy
			CO3	Know the design considerations of electric automobiles
			CO4	Understand principles of working of electric automobiles
40	15 ME 3252	INDUSTRIAL AUTOMATION & CONTROLS	CO1	Understanding Industrial automation and control
			CO2	Understand working principles of different sensors
			CO3	Understand working principles of prime movers
			CO4	Know the working of PLCs
41	15 ME 4159	ROBOTIC MODELING ANALYSIS AND CONTROL	CO1	Analysis of manipulator kinematics
			CO2	Understanding manipulator statics
			CO3	Understanding manipulator dynamics
			CO4	Understand programming languages
42	15 ME 4160	MODELING AND ANALYSIS OF DYNAMIC PHYSICAL SYSTEMS	CO1	Analysis and Synthesis of systems
			CO2	Understanding system response-Time domain
			CO3	Understanding system response-Frequency domain
			CO4	Carried out computer analysis and simulation
43	15 ME 4161	THEORY AND DESIGN OF CONTROL SYSTEMS	CO1	Understand time response design and Digital control
			CO2	Study different plots like Bode plot, polar plot, Nyquist plot etc.
			CO3	Understand Modern control systems
			CO4	Understand Linear control systems
44	15 ME 4162	SMART MATERIALS FOR MECHATRONIC APPLICATIONS	CO1	Understand applications of smart materials
			CO2	Design of smart actuation and control systems
			CO3	Application of piezoelectric actuators
			CO4	Know the future applications of smart materials
45	15 ME 3253	FRACTURE MECHANICS	CO1	Understand Crack growth and fracture mechanics
			CO2	Development of stress field equations in fracture mechanics
			CO3	Know the various methods for evaluating stress intensity factors
			CO4	Understand how to perform fracture toughness testing
46	15 ME 4163	MECHANICAL VIBRATIONS	CO1	Understand and analyze free and forced vibrations
			CO2	Understand Torsional vibrations
			CO3	Understand principle modes of vibrations
			CO4	Understand Mutli-Degree of freedom systems
47	15 ME 4164	PRODUCT DESIGN	CO1	Understand design models and product life cycle
			CO2	Understand concept to Design for Manufacturing
			CO3	Understand concept to Design for Assembly
			CO4	Understand concept to Design for environment and design for sustainability
48	15 ME 4165	FLEXIBLE MANUFACTURING SYSTEMS	CO1	Understand Group Technology Techniques
			CO2	Understand CAPP techniques
			CO3	Understand FMS
			CO4	Understand AGV and ASRS systems
49	15 ME 4166	REVERSE ENGINEERING AND RAPID PROTOTYPING	CO1	Analyze the need of reverse engineering
			CO2	Understand working principles of RP techniques
			CO3	Understand Rapid tooling and RP case studies
			CO4	Understand applications of RP techniques
50	15 ME 4167	CONDITION MONITORING AND FAULT DIAGNOSIS	CO1	Understand types of maintenance
			CO2	Understand Equipment downtime and breakdown analysis
			CO3	Perform Equipment health monitoring
			CO4	Perform and analyze vibration characteristics
51	15 ME 4168	EXPERIMENTAL STRESS ANALYSIS	CO1	Understand three-dimensional stress strain relations
			CO2	Understand Brittle coatings
			CO3	Understand moiré methods
			CO4	Understand photo elasticity
52	15 ME 4169	ADVANCED MECHANISMS DESIGN	CO1	Kinematic analysis of mechanisms
			CO2	Perform path curvature theory
			CO3	Synthesis of mechanisms
			CO4	Understand spatial mechanism and robotics

S NO	Course Code	Course Title	CO NO	Description of the Course Outcome
53	15 ME 4170	COMPUTATIONAL FLUID DYNAMICS	CO1	Understand numerical methods
			CO2	Apply time integration methods
			CO3	Understand numerical grid generation and mapping
			CO4	Apply Navier Stokes Equations
54	15 ME 4171	REFRIGERATION & AIR-CONDITIONING	CO1	Understand working principle of air refrigeration system
			CO2	Understand vapour compression and absorption systems
			CO3	Understand working of steam jet refrigeration system
			CO4	Perform Air-conditioning load calulations
55	15 ME 30B4	ROBOTICS	CO1	Analyze existing robotic systems with respect to their anatomy, type, performance specifications, end effectors etc.
			CO2	Suggest a robotic system design with respect to the suitable sensors, actuators for an intended application and simulate its performance
			CO3	Analyze robot manipulator performance with respect to digital control architecture comprising of PLC's / Microcontroller for an application
			CO4	Understand different programming languages
56	15 ME 30B5	MECHATRONICS	CO1	Identify appropriate sensors, actuator, microcontrollers etc. for a given application
			CO2	Model system performance and estimate the expected system behaviour
			CO3	Suggest a mechatronic product design for the intended application and evaluate its performance
			CO4	Understand digital logic and PLC
57	15 ME 30B6	OPERATIONS RESEARCH	CO1	Model and solve for the optimum solutions using LPP
			CO2	Model and optimize transportation and assignment problems
			CO3	Model and optimize Game theory, DPP, Queuing theory & Simulation problems
			CO4	Understand concepts of PERT/CPM