

MANJARA CHARITABLE TRUST
RAJIV GANDHI INSTITUTE OF TECHNOLOGY, MUMBAI
 (Permanently Affiliated to University of Mumbai)
DEPARTMENT OF MECHANICAL ENGINEERING
 (NBA- Accredited UG Program)

Course Outcomes for Under Graduate Program


Second Year Mechanical Engineering (Semester III)		
Course Code	Course Name	Course Outcomes
MEC301	Applied Mathematics III	Learner will be able to... 1. Demonstrate the ability of using Laplace Transform in solving the Ordinary Differential Equations and Partial Differential Equations 2. Demonstrate the ability of using Fourier Series in solving the Ordinary Differential Equations and Partial Differential Equations 3. Solve initial and boundary value problems involving ordinary differential equations 4. Identify the analytic function, harmonic function, orthogonal trajectories 5. Apply bilinear transformations and conformal mappings 6. Identify the applicability of theorems and evaluate the contour integrals.
MEC302	Thermodynamics	Learner will be able to... 1. Demonstrate application of the laws of thermodynamics to wide range of systems. 2. Write steady flow energy equation for various flow and non-flow thermodynamic systems 3. Compute heat and work interactions in thermodynamics systems 4. Demonstrate the interrelations between thermodynamic functions to solve practical problems. 5. Use steam table and mollier chart to compute thermodynamics interactions 6. Compute efficiencies of heat engines, power cycles etc.
MEC303	Strength of Materials	Learner will be able to... 1. Demonstrate fundamental knowledge about various types of loading and stresses induced. 2. Draw the SFD and BMD for different types of loads and support conditions. 3. Analyze the stresses induced in basic mechanical components. 4. Estimate the strain energy in mechanical elements. 5. Analyze the deflection in beams. 6. Analyze buckling and bending phenomenon in columns, struts and beams.


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Second Year Mechanical Engineering (Semester III)		
Course Code	Course Name	Course Outcomes
MEC304	Production Process	Learner will be able to... 1. Demonstrate understanding of casting process 2. Illustrate principles of forming processes 3. Demonstrate applications of various types of welding processes. 4. Differentiate chip forming processes such as turning, milling, drilling, etc. 5. Illustrate the concept of producing polymer components and ceramic components. 6. Distinguish between the conventional and modern machine tools.
MEC305	Material Technology	Learner will be able to... 1. Identify various crystal imperfections, deformation mechanisms, and strengthening mechanisms 2. Demonstrate understanding of various failure mechanisms of materials. 3. Interpret Iron-Iron carbide phase diagram, and different phases in microstructures of materials at different conditions. 4. Select appropriate heat treatment process for specific applications. 5. Identify effect of alloying elements on properties of steels 6. Illustrate basics of composite materials, Nano-materials and smart materials.
MEL301	Computer Aided Machine Drawing	Learner will be able to... 1. Visualize and prepare detail drawing of a given object. 2. Read and interpret the drawing 3. Draw details and assembly of different mechanical systems. 4. Convert detailed drawing into assembly drawing using modelling software 5. Convert assembly drawing into detailed drawing using modelling software 6. Prepare detailed drawing of any given physical object/machine element with actual measurements

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MEL304	Machine Shop Practice I	Learner will be able to... 1. Operate various machines like lathe, shaper etc. 2. Perform plain turning, taper turning, and screw cutting etc. on lathe machine. 3. Perform machining operations on shaper. 4. Demonstrate metal joining process like compressive welding. 5. Perform forging operations 6. Perform shaping operations
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Second Year Mechanical Engineering (Semester IV)		
Course Code	Course Name	Course Outcomes
MEC401	Applied Mathematics IV	Learner will be able to... 1 Solve the system of linear equations using matrix algebra with its specific rules 2 Demonstrate basics of vector calculus 3 Apply the concept of probability distribution and sampling theory to engineering problems 4 Apply principles of vector calculus to the analysis of engineering problems 5 Identify, formulate and solve engineering problems 6 Illustrate basic theory of correlations and regression
MEC402	Fluid Mechanics	Learner will be able to... 1. Define properties of fluids and classification of fluids 2. Evaluate hydrostatic forces on various surfaces and predict stability of floating bodies 3. Formulate and solve equations of the control volume for fluid flow systems 4. Apply Bernoulli's equation to various flow measuring devices 5. Calculate resistance to flow of incompressible fluids through closed conduits and over surfaces 6. Apply fundamentals of compressible fluid flows to relevant system
MEC 403	Industrial Electronics	Learner will be able to... 1 Illustrate construction, working principles and applications of power electronic switches 2 Identify rectifiers and inverters for dc and ac motor speed control 3 Develop circuits using OPAMP and timer IC555 4 Identify digital circuits for industrial applications 5 Illustrate the knowledge of basic functioning of microcontroller 6 Analyze speed-torque characteristics of electrical machines for speed control


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Second Year Mechanical Engineering (Semester IV)		
Course Code	Course Name	Course Outcomes
MEC404	Production Process II	Learner will be able to... <ol style="list-style-type: none"> 1. Demonstrate understanding of metal cutting principles and mechanism 2. Identify cutting tool geometry of single point and multipoint cutting tool 3. Demonstrate various concept of sheet metal operation 4. Demonstrate concepts and use of jigs and fixtures 5. Illustrate various non-traditional machining techniques 6. Illustrate concepts and applications of additive manufacturing
MEC405	Kinematics of Machinery	Learner will be able to... <ol style="list-style-type: none"> 1. Define various components of mechanisms 2. Develop mechanisms to provide specific motion 3. Draw velocity and acceleration diagrams of various mechanisms 4. Draw Cam profile for the specific follower motion 5. Analyze forces in various gears 6. Select appropriate power transmission for specific application
MEL401	Data Base & Information Retrieval	Learner will be able to... <ol style="list-style-type: none"> 1. Identify data models and schemes in DBMS 2. Demonstrate the features of database management systems and Relational database 3. Use SQL- the standard language of relational databases 4. Demonstrate understanding of functional dependencies and design of the database 5. Design graphical user Interface for specific application 6. Create visual software entities

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MEL405	Machine Shop Practice – II	Learner should be able to 1. Operate lathe machine, 2. Perform shaping operations 3. Perform finishing operations on grinding machine 4. Perform milling operations. 5. Perform precision turning 6. Perform drilling and threading operations.
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Third Year Mechanical Engineering (Semester V)		
Course Code	Course Name	Course Outcomes
MEC501	Internal Combustion Engines	Learner will be able to... 1. Demonstrate the working of different systems and processes of S.I. engines 2. Demonstrate the working of different systems and processes of C.I. engines 3. Illustrate the working of lubrication, cooling and supercharging systems. 4. Analyze engine performance 5. Illustrate emission norms and emission control 6. Comprehend the different technological advances in engines and alternate fuels
MEC502	Mechanical Measurement and Control	Learner will be able to... 1. Classify various types of static characteristics and types of errors occurring in the system. 2. Classify and select proper measuring instrument for linear and angular displacement 3. Classify and select proper measuring instrument for pressure and temperature measurement 4. Design mathematical model of system/process for standard input responses 5. Analyze error and differentiate various types of control systems and time domain specifications 6. Analyze the problems associated with stability
MEC 503	Heat Transfer	Learner will be able to... 1. Identify the three modes of heat transfer (conduction, convection and radiation). 2. Illustrate basic modes of heat transfer 3. Develop mathematical model for each mode of heat transfer 4. Develop mathematical model for transient heat transfer 5. Demonstrate and explain mechanism of boiling and condensation 6. Analyze different heat exchangers and quantify their performance


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Third Year Mechanical Engineering (Semester V)		
Course Code	Course Name	Course Outcomes
MEC504	Dynamics of Machinery	Learner will be able to... 1. Demonstrate working Principles of different types of governor & Gyroscopic effect on the mechanical system 2. Illustrate basic of static and dynamic forces 3. Determine natural frequency of element/system 4. Determine vibration response of mechanical elements / systems 5. Design vibration isolation system for a specific application 6. Demonstrate basic concepts of balancing of forces and couples
MEDLO 5011	Press Tool Design	Learner will be able to.... 1. Demonstrate various press working operations for mass production of sheet metal parts 2. Identify press tool requirements to build concepts pertaining to design of press tools 3. Prepare working drawings and setup for economic production of sheet metal components 4. Select suitable materials for different elements of press tools 5. Illustrate the principles and blank development in bent & drawn components 6. Elaborate failure mechanisms of pressed components, safety aspects and automation in press working
MEDLO 5012	Machining Sciences And Tool Design	Learner will be able to... 1. Calculate the values of various forces involved in the machining operations 2. Design various single and multipoint cutting tools 3. Analyze heat generation in machining & coolant operation 4. Illustrate the properties of various cutting tool materials and hence select an appropriate tool material for particular machining application 5. Demonstrate the inter-relationship between cutting parameters and machining performance measures like power requirement, cutting time, tool life and surface finish 6. Analyze economics of machining operations


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Third Year Mechanical Engineering (Semester V)		
Course Code	Course Name	Course Outcomes
MEDLO 5013	Design of Jigs & Fixtures	Learner will be able to... 1. Write methodically, the sequence of operations of simple work-piece 2. Identify and select locating and clamping points on work-piece 3. Demonstrate construction of drill jig 4. Illustrate construction of milling fixture 5. Identify appropriate combination of tools, jigs and fixture, suitable for a particular machining operation 6. Design assembly of jigs and fixtures on simple work-piece
MEL506	Business Communication & Ethics	Learner will be able to... 1. Design a technical document using precise language, suitable vocabulary and apt style. 2. Develop the life skills/ interpersonal skills to progress professionally by building stronger relationships. 3. Demonstrate awareness of contemporary issues knowledge of professional and ethical responsibilities. 4. Apply the traits of a suitable candidate for a job/higher education, upon being trained in the techniques of holding a group discussion, facing interviews and writing resume/SOP. 5. Deliver formal presentations effectively implementing the verbal and non-verbal skills


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Third Year Mechanical Engineering (Semester VI)		
Course Code	Course Name	Course Outcomes
MEC601	Metrology & Quality Engineering	Learner will be able to... 1. Demonstrate inspection methods and different gauges 2. Illustrate working principle of measuring instruments and calibration methodology 3. Illustrate basic concepts and statistical methods in quality control 4. Demonstrate characteristics of screw threads, gear profile, and tool profile 5. Illustrate the different sampling techniques in quality control 6. Illustrate different nondestructive techniques used for quality evaluation
MEC602	Machine Design – I	Learner will be able to... 1. Demonstrate understanding of various design considerations 2. Illustrate basic principles of machine design 3. Design machine elements for static as well as dynamic loading 4. Design machine elements on the basis of strength/ rigidity concepts 5. Use design data books in designing various components 6. Acquire skill in preparing production drawings pertaining to various designs
MEC603	Finite Element Analysis	Learner will be able to... 1. Solve differential equations using weighted residual methods 2. Develop the finite element equations to model engineering problems governed by second order differential equations 3. Apply the basic finite element formulation techniques to solve engineering problems by using one dimensional elements 4. Apply the basic finite element formulation techniques to solve engineering problems by using two dimensional elements 5. Apply the basic finite element formulation techniques to find natural frequency of single degree of vibration system 6. Use commercial FEA software, to solve problems related to mechanical engineering


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Third Year Mechanical Engineering (Semester VI)		
Course Code	Course Name	Course Outcomes
MEC604	Refrigeration & Air Conditioning	Learner will be able to... 1. Demonstrate fundamental principles of refrigeration and air conditioning 2. Identify and locate various important components of the refrigeration and air conditioning system 3. Illustrate various refrigeration and air conditioning processes using psychometric chart 4. Design Air Conditioning system using cooling load calculations. 5. Estimate air conditioning system parameters 6. Demonstrate understanding of duct design concepts
MEDLO 6021	Mechatronics	Learner will be able to... 1. Identify the suitable sensor and actuator for a mechatronics system 2. Select suitable logic controls 3. Analyze continuous control logics for standard input conditions 4. Develop ladder logic programming 5. Design hydraulic/pneumatic circuits 6. Design a mechatronic system
MEDLO 6022	Robotics	Learner will be able to... 1. Demonstrate the basic functioning of a robot 2. Identify various components of robots 3. Carryout kinematic analysis, workspace analysis, and trajectory planning for a robot 4. Identify suitable sensors/actuators for robot 5. Select an appropriate robot for given industrial inspection and material handling systems. 6. Illustrate various aspects of a robot as a humanoid
MEDLO 6023	Industrial Automation	Learner will be able to... 1. Demonstrate basics of industrial automation 2. Identify various types of automation 3. Demonstrate use of automated controls using pneumatic and hydraulic systems. 4. Illustrate the control systems in automated system. 5. Demonstrate applicability of PLC in process industry 6. Design electro-pneumatic circuits



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Final Year Mechanical Engineering (Semester VII)		
Course Code	Course Name	Course Outcomes
MEC701	Machine Design – II	Learner will be able to... <ol style="list-style-type: none"> 1. Select appropriate gears for power transmission on the basis of given load and speed 2. Design gears based on the given conditions. 3. Select bearings for a given applications from the manufacturers catalogue. 4. Select and/or design belts and flywheel for given applications 5. Design cam and follower mechanisms. 6. Design clutches and brakes
MEC702	CAD/CAM/CAE	Learner will be able to... <ol style="list-style-type: none"> 1. Identify proper computer graphics techniques for geometric modelling. 2. Transform, manipulate objects & store and manage data. 3. CAM Tool path Creation and NC- G code output. 4. Use rapid prototyping and tooling concepts in any real life applications. 5. Identify the tools for Analysis of a complex engineering component
MEC703	Production Planning & Control	Learner will be able to... <ol style="list-style-type: none"> 1. Illustrate production planning functions and manage manufacturing functions in a better way 2. Develop competency in scheduling and sequencing of manufacturing operations 3. Forecast the demand of the product and prepare an aggregate plan 4. Develop the skills of Inventory Management and cost effectiveness 5. Create a logical approach to Line Balancing in various production systems 6. Implement techniques of manufacturing planning and control



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MEDLO 7031	Mechanical Vibration	Learner will be able to... 1. Develop mathematical model to represent dynamic system. 2. Estimate natural frequency of mechanical element / system. 3. Analyze vibratory response of mechanical element / system. 4. Estimate parameters of vibration isolation system 5. Control the vibrations to the acceptable level using basic vibration principles 6. Handle the vibration measuring instruments
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Final Year Mechanical Engineering (Semester VII)		
Course Code	Course Name	Course Outcomes
MEDLO 7032	Automobile Engineering	Learner will be able to... 1. Illustrate the types and working of clutch and transmission system. 2. Demonstrate the working of different types of final drives, steering gears and braking systems 3. Illustrate the constructional features of wheels, tyres and suspension systems 4. Demonstrate the understanding of types of storage, charging and starting systems 5. Identify the type of body and chassis of an automobile 6. Comprehend the different technological advances in automobile
MEDLO 7033	Pumps, Compressors & Fans	Learner will be able to... 1. Select suitable Pump 2. Design a reciprocating pump and analyze its performance 3. Design a centrifugal pump and analyze its performance 4. Demonstrate basic principles of fans and blowers 5. Design fan/blower and analyze its performance 6. Design a compressor and analyses its performance


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MEDLO 7034	Computational Fluid Dynamics	Learner will be able to... 1. Demonstrate methodology to work with CFD 2. Illustrate principles of grid generation and discretization methods 3. Identify and apply specific boundary conditions relevant to specific application 4. Decide solution parameters relevant to specific application 5. Analyze the results and draw the appropriate inferences 6. Demonstrate basic principles of FVM
ILO7011	Product Life Cycle Management	Learner will be able to... 1. Gain knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation. 2. Illustrate various approaches and techniques for designing and developing products. 3. Apply product engineering guidelines / thumb rules in designing products for molding, machining, sheet metal working etc. 4. Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant
ILO7012	Reliability Engineering	Learner will be able to... 1. Understand and apply the concept of Probability to engineering problems 2. Apply various reliability concepts to calculate different reliability parameters 3. Estimate the system reliability of simple and complex systems 4. Carry out a Failure Mode Effect & Criticality Analy.
ILO7014	Design of Experiments	Learner will be able to... 1. Plan data collection, to turn data into information and to make decisions that lead to appropriate action 2. Apply the methods taught to real life situations 3. Plan, analyze, and interpret the results of experiments


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ILO7015	Operations Research	Learner will be able to... 1. Understand the theoretical workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness. 2. Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change. 3. Solve specialized linear programming problems like the transportation and assignment problems, solve network models like the shortest path, minimum spanning tree, and maximum flow problems. 4. Understand the applications of integer programming and a queuing model and compute important performance measures
ILO7018	Energy Audit & Management	Learner will be able to... 1. To identify and describe present state of energy security and its importance. 2. To identify and describe the basic principles and methodologies adopted in energy audit of a utility. 3. To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities. 4. To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities 5. To analyze the data collected during performance evaluation and recommend energy saving measures


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Final Year Mechanical Engineering (Semester VIII)		
Course Code	Course Name	Course Outcomes
MEC801	Design of Mechanical Systems	Learner will be able to... 1. Apply the concept of system design. 2. Design material handling systems such as hoisting mechanism of EOT crane, 3. Design belt conveyer systems 4. Design engine components such as cylinder, piston, connecting rod and crankshaft 5. Design pumps for the given applications 6. Prepare layout of machine tool gear box and select number of teeth on each gear
MEC802	Industrial Engineering & Management	Learner will be able to... 1. Illustrate the need for optimization of resources and its significance 2. Develop ability in integrating knowledge of design along with other aspects of value addition in the conceptualization and manufacturing stage of various products. 3. Demonstrate the concept of value analysis and its relevance. 4. Manage and implement different concepts involved in method study and understanding of work content in different situations. 5. Describe different aspects of work system design and facilities design pertinent to manufacturing industries. 6. Illustrate concepts of Agile manufacturing, Lean manufacturing and Flexible manufacturing
MEC803	Power Engineering	Learner will be able to... 1. Compute heat interactions in combustion of reactive mixtures 2. Differentiate boilers, boiler mountings and accessories 3. Calculate boiler efficiency and assess boiler performance 4. Demonstrate working cycles of gas turbines 5. Draw velocity triangles of impulse/reaction turbines and calculate performance parameters/efficiency 6. Demonstrate basic working of pumps


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Final Year Mechanical Engineering (Semester VIII)		
Course Code	Course Name	Course Outcomes
MEDLO 8041	Power Plant Engineering	Learner will be able to... 1. Comprehend various equipment/systems utilized in power plants 2. Demonstrate site selection methodology, construction and operation of Hydro Electric Power Plants 3. Discuss working, site selection, advantages, disadvantages of steam power plants 4. Discuss operation of Combined Cycle Power Plants 5. Discuss types of reactors, waste disposal issues in nuclear power plants 6. Illustrate power plant economics
MEDLO 8042	Rapid Prototyping	Learner will be able to... 1. Select the feasible RP process 2. Select the feasible RP material 3. Gauge and Hybridize the ever-evolving Prototyping Technologies 4. Contribute towards the Product Development at the respective domain in the industry 5. Apply RP to build working prototypes 6. Demonstrate basics of virtual reality
MEDLO 8043	Renewable Energy Sources	Learner will be able to... 1. Demonstrate need of different renewable energy sources 2. Discuss importance of renewable energy sources 3. Discuss various renewable energy sources in Indian context 4. Calculate and analyze utilization of solar and wind energy 5. Illustrate design of biogas plant 6. Demonstrate basics of hydrogen energy


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MEDLO 8044	Energy Management in Utility Systems	Learner will be able to... 1. Demonstrate general aspects of energy management 2. Summarize and explain need for energy management, economics and auditing 3. Illustrate basics of energy economics and financial analysis techniques 4. Describe importance of thermal and electrical utilities maintenance 5. Assess potential and summaries benefits of waste heat recovery and cogeneration 6. Illustrate waste heat recovery and cogeneration methods
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Final Year Mechanical Engineering (Semester VIII)		
Course Code	Course Name	Course Outcomes
ILO8021	Project Management	Learner will be able to... 1. Apply selection criteria and select an appropriate project from different options. 2. Write work break down structure for a project and develop a schedule based on it. 3. Identify opportunities and threats to the project and decide an approach to deal with them strategically. 4. Use Earned value technique and determine & predict status of the project. 5. Capture lessons learned during project phases and document them for future reference
ILO8022	Finance Management	Learner will be able to... 1. Understand Indian finance system and corporate finance 2. Take investment, finance as well as dividend decisions
ILO8023	Entrepreneurship Development & Management	Learner will be able to... 1. Understand the concept of business plan and ownerships 2. Interpret key regulations and legal aspects of entrepreneurship in India 3. Understand government policies for entrepreneurs

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ILO8024	Human Resource Management	Learner will be able to... 1. Understand the concepts, aspects, techniques and practices of the human resource management. 2. Understand the Human resource management (HRM) processes, functions, changes and challenges in today's emerging organizational perspective. 3. Gain knowledge about the latest developments and trends in HRM. 4. Apply the knowledge of behavioral skills learnt and integrate it with in inter personal and intergroup environment emerging as future stable engineers and managers
ILO8025	Professional Ethics and Corporate Social Responsibility (CSR)	Learner will be able to... 1. Understand rights and duties of business 2. Distinguish different aspects of corporate social responsibility 3. Demonstrate professional ethics 4. Understand legal aspects of corporate social responsibility

Final Year Mechanical Engineering (Semester VIII)		
Course Code	Course Name	Course Outcomes
ILO8026	Research Methodology	Learner will be able to... 1. Prepare a preliminary research design for projects in their subject matter areas 2. Accurately collect, analyze and report data 3. Present complex data or situations clearly 4. Review and analyze research findings
ILO8027	IPR & Patenting	Learner will be able to... 1. Understand Intellectual Property assets 2. assist individuals and organizations in capacity building 3. work for development, promotion, protection, compliance, and enforcement of Intellectual Property and Patenting
ILO8028	Digital Business Management	The learner will be able to 1. Identify drivers of digital business 2. Illustrate various approaches and techniques for E-business and management 3. Prepare E-business plan

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ILO8029	Environmental Management	Learner will be able to... 1. Understand the concept of environmental management 2. Understand ecosystem and interdependence, food chain etc. 3. Understand and interpret environment related legislations
ILO8025	Professional Ethics and Corporate Social Responsibility (CSR)	Learner will be able to... 1. Understand rights and duties of business 2. Distinguish different aspects of corporate social responsibility 3. Demonstrate professional ethics 4. Understand legal aspects of corporate social responsibility