

**THE UNIVERSITY OF LAHORE
ISLAMABAD CAMPUS**

BS MECHANICAL ENGINEERING
Course Learning Outcomes

SEMESTER-1

S. No	Course Code	Course Title	Credit Hours
1	CHM01102	Applied Chemistry	(2-0-2)
2	MAT12140	Calculus & Analytical Geometry	(3-0-3)
3	PHY01115	Applied Physics	(2-1-3)
4	CS02111	Computer Systems & Programming	(2-1-3)
5	ME02112	Engineering Drawing & Graphics	(1-1-2)
6	ENG12102	Functional English	(2-0-2)
7	ME03133	Introduction to Engineering	(1-0-1)
		Total Cr. Hrs.	(13-3-16)

Applied Chemistry

CLO	Description	Domain	Taxonomy Level	PLO
1	Demonstrate working knowledge of applied chemistry and its application to mechanical engineering field.	Cognitive	3	1
2	Identify chemical compounds with harmful effects on environment and propose their control	Cognitive	1	7
3	Apply the acquired knowledge to identify, formulate and solve engineering problems of chemical nature in field of mechanical Engineering.	Cognitive	3	1

Calculus & Analytical Geometry

CLO	Description	Domain	Taxonomy Level	PLO
1	Discuss the results/theorems of complex analysis to complex valued functions, limits and continuity	Cognitive	2	1
2	Use derivatives and integrals to solve problems involving rates of change, optimization, and areas	Cognitive	3	3
3	Describe the idea of physical interpretations of differentiation and integration and understand the connection between them implied by the Fundamental Theorem of Calculus	Cognitive	2	2
4	Explanation of integration techniques for finding area	Cognitive	2	2

Applied Physics

CLO	Description	Domain	Taxonomy Level	PLO
1	Recall SI Units. Define position, velocity and acceleration with examples and illustrating them according to the situations. Understands vectors and motion in 2-D and 3-D.	Cognitive	1,3,4	2
2	Explain Newtonian Mechanics. Solve problems in inertial reference frame. Define and analyze friction, force and energy.	Cognitive	1,2,3,4	2
3	State and explain Coulomb's law. Categorize insulators and conductors.	Cognitive	1,2,4	2
4	Discuss about electric and magnetic fields. Apply Gauss' law in different symmetries.	Cognitive	2,3	2
5	Perform given experiments and execute with improved results. Construct table of observations and calculation for comparison with theoretical / exact values.	Psychomotor	4,5,7	2
6	Follow the instructions provided and behave according to the rules and regulations. Cooperate with each other during works.	Affective	2,3,5	8

Computer Systems & Programming

CLO	Description	Domain	Taxonomy Level	PLO
1	Identify various computer systems. Enable students to understand working and construction of various computer peripherals, storage media and types of software.	Cognitive	1	1
2	Demonstrate an ability to write, debug and execute programs in C++ programming language	Cognitive	1,2	2
3	Use C++ programming to solve Engineering problems	Cognitive	3	3

Engineering Drawing & Graphics

CLO	Description	Domain	Taxonomy Level	PLO
1	Acquire the basic knowledge of drawing skills and translate mental images into pictures.	Cognitive	2	1
2	Apply the concept of basic drawing techniques for communication and construction of drawings.	Cognitive	3	2
3	Demonstrate individually the drawing of plan, elevation and cross sections of machine parts.	Psychomotor	4	3
4	Show concern in theory and practical drawing work and follow instructions carefully.	Affective	2,3	3

Functional English

CLO	Description	Domain	Taxonomy Level	PLO
1	Communicate in written English by using the correct grammar and vocabulary	Affective	3	10
2	Communicate orally in professional discussions by using the correct sentence structure.	Affective	4	10

Introduction to Engineering

CLO	Description	Domain	Taxonomy Level	PLO
1	Acquire the knowledge of different engineering disciplines to get technological exposure	Cognitive	2	1
2	Understand responsibility as an engineer to work closely with society for problems identification for future actions	Cognitive	2	6
3	Acquire the knowledge for ethical reasoning and to take appropriate actions	Cognitive	2	8

SEMESTER-2

S. No	Course Code	Course Title	Credit Hours
1	MAT01109	Linear Algebra and Differential Equations	(3-0-3)
2	ENG03104	Communication Skills	(2-0-2)
3	ME02102	Engineering Materials	(3-0-3)
4	ME03101	Engineering Statics	(3-0-3)
5	SS03102	Islamic Studies	(2-0-2)
6	ME01101	Thermodynamics-I	(3-0-3)
7	ME02103	Workshop Practice	(0-2-2)
		Total	(16-2-18)

Linear Algebra and Differential Equations

CLO	Description	Domain	Taxonomy Level	PLO
1	Solve first and second order differential equations and apply the concepts of differentials to model the real-life problems.	Cognitive	3	2
2	Explain procedure of Matrix Algebra and solve systems of linear equations.	Cognitive	3	1
3	Define vector spaces, linear transformations, eigen values and eigen vectors.	Cognitive	1	1

Communication Skills

CLO	Description	Domain	Taxonomy Level	PLO
1	Recognize, analyze, and accommodate while communicating with diverse audiences.	Psychomotor	1	9
2	Display supporting language techniques and personality grooming which cater to the requirements of corporate sector.	Cognitive	4	5
3	Analyze the ethical responsibilities involved in communication.	Effective	5	8
4	Locate, evaluate, and incorporate pertinent information.	Cognitive	6	10

Engineering Materials

CLO	Description	Domain	Taxonomy Level	PLO
1	Explain different material types in terms of bonding and crystal structure.	Cognitive	2	1
2	Identify the difference and application of different types of microscopic techniques that are available for investigating the microstructure.	Cognitive	1	4
3	Apply Read and interpret Phase-Diagrams and effect of ferrous materials. of heat treatments on microstructure	Cognitive	2	2
4	Analyze the effect of micro-structure and heat treatment on end use properties/mechanical properties of materials.	Cognitive	4	4
5	Differentiate the property differences between Metals, Polymers & Composites and their implications in terms of environment and sustainability.	Cognitive	4	7

Engineering Statics

CLO	Description	Domain	Taxonomy Level	PLO
1	Comprehend concepts of vectors and scalars, forces, moments and couples	Cognitive	2	1
2	Apply the learned concepts of forces, moments and couples to solve problems of equilibrium in 2-D and 3-D	Cognitive	3	2
3	Analyze structures such as plain trusses, frames and machines for reaction forces	Cognitive	4	2
4	Apply the concepts of mechanics to solve problems of friction	Cognitive	3	2

Islamic Studies

CLO	Description	Domain	Taxonomy Level	PLO
1	To provide basic information about Islam	Cognitive	2	11
2	To improve students skill to perform prayers and other worships.	Cognitive	3	9
3	To enhance the skill of the students for understanding of issues related to faith and religious life.	Affective	3	7
4	To enhance understanding of students regarding Islamic Civilization.	Cognitive	4	10

Thermodynamics I

CLO	Description	Domain	Taxonomy Level	PLO
1	Understand the nature and role of the thermodynamics properties of matter and processes on appropriate diagrams	Cognitive	2	1
2	Apply energy and entropy balances to the closed and open systems.	Cognitive	3	1
3	Analyze implications and limitations of the Second Law of Thermodynamics.	Cognitive	3	2

Workshop Practice

CLO	Description	Domain	Taxonomy Level	PLO
1	Describe different machines, equipment and processes related to various mechanical workshops.	Cognitive	3	1
2	Identify and use marking out tools, handtools, measuring equipment, and perform a range of fitting processes to produce a given project to specific tolerances.	Psychomotor	3	3
3	Select and apply appropriate methodologies to quality control and inspection of welding, and Machining Operations.	Psychomotor	3, 5	4
4	Pay attention to the correct and safe usage of machine components, tools and their associated operations.	Affective	4	9

SEMESTER-3

S. No	Course Code	Course Title	Credit Hours
1	EE01205	Electrical Engineering	(2-1-3)
2	ME03202	Engineering Dynamics	(3-1-4)
3	ME01202	Fluid Mechanics-I	(3-0-3)
4	ME03203	Mechanics of Materials-1	(3-0-3)
5	SS05202	Pakistan Studies	(2-0-2)
6	ME01203	Thermodynamics-II	(3-1-4)
		Total	(16-3-19)

Electrical Engineering

CLO	Description	Domain	Taxonomy Level	PLO
1	Perform analysis of electric circuits using mesh analysis, nodal analysis, norton theorem, superposition theorem and thevenin theorem	Cognitive	3	1
2	Design of electronic and electrical circuits such as op-amps, capacitive circuit and inductive circuit	Cognitive	5	4
3	Investigate concepts learned in the theory by performing experiments in lab	Cognitive	3	5

Engineering Dynamics

CLO	Description	Domain	Taxonomy Level	PLO
1	Comprehend key concepts and solve problems related to kinematics of particles involving position, velocity and acceleration in Cartesian, Normal & Tangential, Polar and Cylindrical Coordinate Systems.	Cognitive	2	1
2	Comprehend key concepts and solve problems related to kinetics of particles involving direct application of Newton's Second Law of Motion, work & energy and Impulse & momentum etc.	Cognitive	2	1
3	Calculate various motion parameters related to the kinematics of rigid bodies under translation and rotation / general plane motion.	Cognitive	4	2
4	Analyze and solve the problems related to kinetics of rigid bodies using different principles and techniques for their solution	Cognitive	4	2
5	Execute experiments and find out unknowns such as forces, moments, positions and velocities.	Psychomotor	3	4
6	Respond to the instruction clearly and develop a positive attitude towards team work.	Affective	2	9
7	Knowledge of basic principles of Engineering Mechanics, Interpretation of experimental values and collection of data.	Cognitive	6	1

Fluid Mechanics-I

CLO	Description	Domain	Taxonomy Level	PLO
1	Apply the basic concepts to hydrostatic fluid problems	Cognitive	2	1
2	Analyze the fluid kinematics and dynamics parameters using basic laws of fluid mechanics	Cognitive	4	2
3	Solve the pipe flow problems using Bernoulli and energy equation	Cognitive	3	2
4	Understand the concept of dimensional analysis	Cognitive	1	1

Mechanics of Materials-1

CLO	Description	Domain	Taxonomy level	PLO
1.	Understand the basics of mechanics of materials and their mechanical Properties	Cognitive	1	1
2.	Calculate the stresses and strains in mechanical structures	Cognitive	2	2
3.	Solve problems related to extension, compression, bending, torsion and deflection in mechanical Structures	Cognitive	4	2

Pakistan Studies

CLO	Description	Domain	Taxonomy Level	PLO
1	Understand the importance of Geographic Location, Foreign Policy as a relation of Pakistan in global prospective.	Cognitive	2	6
2	Understand the ideology and the struggle behind the creation of Pakistan	Cognitive	2	10

Thermodynamics-II

CLO	Description	Domain	Taxonomy level	PLO
1.	Students will be able to discuss basic concepts regarding steam properties and steam power generation cycles and related components.	Cognitive	2	1
2.	Students will be able to analyze different configurations and working of thermodynamic machinery (Compressors, Nozzles) through suitable diagrams and mathematical calculations.	Cognitive	4	2
3.	Students will be able to interpret combustion equations according to specific requirements of thermodynamic machinery like IC Engines.	Cognitive	6	3
4.	Students will be able to conduct experiments for the measurement and calculation of different thermodynamic parameters of engines, compressors, generators and power plants.	Psychomotor	4	4
5.	Students will be able to cooperate with team members and show effective communication and leadership skills.	Affective	2	9

SEMESTER-4

S. No	Course Code	Course Title	Credit Hours
1	EE04221	Electronics	(2-1-3)
2	MAT07203	Complex Variables & Transforms	(3-0-3)
3	ME01205	Fluid Mechanics-II	(3-1-4)
4	ME03204	Machine Design & CAD-I	(2-1-3)
5	ME03205	Mechanics of Materials-II	(3-1-4)
6	SS01203	Psychology & Human Behavior	(2-0-2)
		Total	(15-4-19)

Electronics

CLO	Description	Domain	Taxonomy level	PLO
1	Discuss Intrinsic & Extrinsic Materials, n-type & p-type Materials, Construction, Diode equivalent Circuits, Zener Diode, Clipper, Clampers, Rectifier (Half-Wave & Full-Wave).	Cognitive	2	1
2	Analyze Zener Diode, Clipper, Clampers, Rectifier (Half-Wave & Full-Wave).	Cognitive	4	2
3	Discuss Bipolar Junction Transistors (BJTs)	Cognitive	2	1
4	Construct different electronic circuits on breadboard and measure the input and output voltages and currents using digital multi-meter (DMM) and digital storage oscilloscope (DSO)	Psychomotor	5	4
5	Use simulation tools to simulate different electronic circuits containing diodes, BJTs, MOSFETs and OP-Amps and interpret the data obtained from these circuits to derive valid conclusions	Cognitive	3	5

Complex Variables & Transforms

CLO	Description	Domain	Taxonomy Level	PLO
1	Solve and identify Complex number system, Complex functions and their Integrals.	Cognitive	3	1
2	Apply the concept of Laplace and inverse Laplace transforms.	Cognitive	3	2
3	Apply Fourier transform to periodic and a periodic functions.	Cognitive	3	1

Fluid Mechanics-II

CLO	Description	Domain	Taxonomy Level	PLO
1	Understand the theories dealing with the different flow phenomena of fluid.	Cognitive	1, 2	1
2	Apply principles of mass, momentum and energy conservation laws along with their differential forms on compressible / incompressible viscous /in-viscous flows.	Cognitive	3	2
3	Investigation of laminar and turbulent flow regimes in different fluid systems using fluid mechanics principles.	Cognitive	4	4
4	Analyze the fluid kinematics and dynamics parameters using basic laws of mechanics, Calculate fluid flow parameters for various geometries	Psychomotor	4	2
5	Show concern and positive attitude towards discipline, team work and instructions	Affective	2	9
6	Evaluate the performance of various fluid devices, collection of data and interpretation of experimental results	Cognitive	2	1

Machine Design & CAD-I

CLO	Description	Domain	Taxonomy Level	PLO
1	Apply a working knowledge of common machine elements including their fundamental design, their modes of failure, the scientific concepts behind them, their selection and their installation and successful use.	Cognitive	2	1
2	Apply a design problem solving methodology.	Cognitive	4	3
3	Design simple systems using common mechanical components.	Cognitive	2	6
4	Design the Finite Element Analysis problems in MATLAB and ANSYS and perform the analysis on mechanical related applications	Psychomotor	7	2
5	Show concern and positive attitude towards instructions and team work	Affective	3	9
6	Knowledge of existing as well as develop new computer-based techniques and algorithms for the analysis, selection, and synthesis of mechanical components	Cognitive	6	1

Mechanics of Materials-II

CLO	Description	Domain	Taxonomy level	PLO
1	Analyse stresses and strains for two- and three-dimensional cases using various techniques	Cognitive	3	2
2	Understand theory of failure of materials	Cognitive	1	1
3	Solve problems related to early failure of materials under special conditions like fatigue, creep etc	Cognitive	2	2
4	Analyze stresses in thick walled cylinders and columns	Cognitive	4	2

Psychology & Human Behavior

CLO	Description	Domain	Taxonomy Level	PLO
1	Students will be able to discuss the overview, basic concepts and theories of psychology and their application for personality assessment.	Cognitive	2	6
2	Students will be able to analyze maladaptive behavior, conditioned learning and intelligence, and dealing with various emotional states.	Cognitive	4	2
3	Students will be able to develop assessments using psychological and self-improvement techniques proposed by best-selling self-help authors in the world.	Cognitive	5	12
4	Students will be able to interpret the FAQs (Frequently Asked Questions) by common people regarding psychology and Human Behavior.	Cognitive	6	4

SEMESTER-5

S. No	Course Code	Course Title	Credit Hours
1	MAT06305	Numerical Analysis	(3-0-3)
2	ME01306	Heat and Mass Transfer	(3-1-4)
3	ME03306	Machine Design & CAD-II	(3-1-4)
4	ME02304	Precision Engineering & Metrology	(2-1-3)
5	ENG07206	Technical Writing & Presentation Skills	(3-0-3)
		Total	(14-3-17)

Numerical Analysis

CLO	Description	Domain	Taxonomy Level	PLO
1	Analyze the complex mathematical problem using different numerical methods such as Newton Raphson method, Bisection, Jacobi iteration etc.	Cognitive	4	2
2	Apply numerical algorithms to interpolate functions using different formulas like Lagrange, Newton's divided difference etc.	Cognitive	3	1
3	Use the concept of interpolation to differentiate and integrate complicated functions and solve ordinary differential equations using different numerical techniques.	Cognitive	3	2

Heat and Mass Transfer

CLO	Description	Domain	Taxonomy Level	PLO
1	Apply governing equations of heat	Cognitive	3	2
2	Analyze the performance and thermal design of heat exchangers under various conditions	Cognitive	4	2
3	Solve the real life complex engineering problems related to heat transfer	Cognitive	5	3
4	Master the experiment while performing it perfectly and guides his fellow students.	Psychomotor	5	2
5	Follow the instructions provided and according to the rules and regulations	Affective	2	8

Machine Design & CAD-II

CLO	Description	Domain	Taxonomy Level	PLO
1	Calculate stresses in gear teeth.	Cognitive	3	2
2	Identify the parameters for the selection of standard machine elements, such as journal bearings, rolling contact bearings, chains, belts, clutches and brakes.	Cognitive	4	2

3	Design the machine elements for desired outputs, including gears, springs, journal bearings, rolling contact bearings, chains and belts.	Cognitive	5	3
4	Design the Finite Element Analysis problems in MATLAB and ANSYS and perform the analysis on mechanical related applications	Psychomotor	7	2
5	Show concern and positive attitude towards instructions and team work	Affective	3	9
6	Knowledge of existing as well as develop new computer-based techniques and algorithms for the analysis, selection, and synthesis of mechanical components	Cognitive	6	1

Precision Engineering & Metrology

CLO	Description	Domain	Taxonomy Level	PLO
1	Understand the basic concepts related to measurements, construct general measurement system, related experimental design plan	Cognitive	2,3	1
2	Analyze repeatability and uncertainty of instruments, Errors of measurement system using necessary statistical principles	Cognitive	4	2
3	Demonstrate operations of various devices used to measure length, pressure, temperature, strain flow rate and strain	Cognitive	3	1
4	Adapts fundamental concepts of measuring to take measurements of different objects by using different measuring tools and instruments.	Psychomotor	6	2
5	Show continual behavior towards teamwork, instructions and discipline.	Affective	3	9
6	Knowledge of performing experiments, data collection and Interpretation of experimental results	Cognitive	6	1

Technical Writing & Presentation Skills

CLO	Description	Domain	Taxonomy Level	PLO
1	Recognize, analyze, and accommodate diverse	Psychomotor	1	9

	audiences.			
2	Produce documents appropriate to audience, purpose and genre and also design and test documents for easy reading and navigation	Cognitive	4	5
3	Analyze the ethical responsibilities involved in technical communication.	Affective	5	8
4	Locate, evaluate, and incorporate pertinent information.	Cognitive	6	10

SEMESTER-6

S. No	Course Code	Course Title	Credit Hours
1	ME4111	Control Engineering	(2-1-3)
2	MA3001	Engineering Statistics & Probability	(3-0-3)
3	ME2303	Manufacturing Processes-I	(3-1-4)
4	ME3116	Mechanics of Machines	(3-1-4)
5	ME4208	Refrigeration & Air Conditioning	(3-1-4)
		Total	(14-4-18)

Control Engineering

CLO	Description	Domain	Taxonomy Level	PLO
1	Make mathematical models of different physical system	Cognitive	3	3
2	Analyze complex engineering problems using mathematical models to examine different properties of the system	Cognitive	4	2
3	Develop a controller to achieve the desired response from the system	Cognitive	5	3

Engineering Statistics& Probability

Description	CLO	Domain	Taxonomy level	PLO
1	Explain the basic concept of statistics and dispersion of data.	Cognitive	2	1
2	Apply linear regression for statistical data analysis and curve fitting	Cognitive	3	2
3	Discuss random variables, concept of probability and various probability distributions	Cognitive	2	3

Manufacturing Processes-I

CLO	Description	Domain	Taxonomy level	PLO
1	Understand various manufacturing Processes	Cognitive	2	1
2	Identify the right type of operation and its parameters for performing manufacturing processes	Cognitive	4	2
3	Apply effectively various manufacturing techniques/operations in broad spectrum of engineering and manufacturing companies	Cognitive	3	2
4	Carry out Experiments by using different Machine tools and manufacturing processes.	Psychomotor	5	5
5	Show concern and positive attitude towards instructions and team work	Affective	4	9
6	Acquire Knowledge about various Machine tools, right type of operations and its parameters for performing manufacturing processes	Cognitive	3	1

Mechanics of Machines

CLO	Description	Domain	Taxonomy Level	PLO
1	Understand the concepts of mechanics for the design of machine elements.	Cognitive	2	1
2	Calculate the dynamic (Kinematic and kinetic) characteristics of mechanisms such as linkages, cams, gears, governors and unbalance masses.	Cognitive	3	2
3	Relate analytical and/or graphical solutions to complex engineering Problems in various machines and mechanisms.	Cognitive	4	3
4	Solutions to complex engineering problems in various machines and mechanisms	Psychomotor	3	2
5	Respond to the instruction clearly and develop a positive attitude towards team work	Affective	4	8
6	Understand the concepts of mechanics and knowledge about design of machine elements	Cognitive	2	1

Refrigeration & Air Conditioning

CLO	Description	Domain	Taxonomy Level	PLO
1	Identify the basic concept to understand various components of the refrigeration and air conditioning system (vapour compression system, vapour absorption system and comparison of actual and theoretical refrigeration cycle)	Cognitive	1	1
2	Apply the fundamental concept related to design and selection of various refrigeration components (condenser and evaporator, compressor and refrigerant flow control devices)	Cognitive	3	2
3	Analyze the factor effecting thermal comfort in AC zones and air treatment/handling requirements for public building services, architectural and HVAC equipment	Cognitive	4	7

4	Calculate the heating and cooling load for various structures/buildings (utilization of software HAP)	Cognitive	3	4
5	Adapt the fundamental concept to simulate and diagnose the self-generated faults related to selection of various refrigeration components, Heating and cooling load calculations	Psychometry	6	2
6	Follow the instructions provided and according to the rules and regulations	Affective	4	8
7	Identify the basic concept to understand various components of the refrigeration and air conditioning system , Mechanical heat pump and cooling tower	Cognitive	3	1

SEMESTER-7

S. No	Course Code	Course Title	Credit Hours
1	ME4311	Engineering Economics	(2-0-2)
2	ME3304	Manufacturing Processes-II	(3-1-4)
3	ME4113	Mechanical Vibrations	(3-1-4)
4	ME4117	Mechatronics	(3-0-3)
5	ME4050	Project-I	(0-3-3)
		Total	(11-5-16)

Engineering Economics

CLO	Description	Domain	Taxonomy Level	PLO
1	Understand the basic knowledge of cost and taxation concepts	Cognitive	2	1
2	Develop the cash flow diagrams based on the time value of money	Cognitive	3	2
3	Solve economics problems involving comparison and selection of alternatives by using variety of analytical and computational techniques.	Cognitive	3	5

Manufacturing Processes-II

CLO	Description	Domain	Taxonomy Level	PLO
1	Understand various manufacturing processes.	Cognitive	2	1
2	Identify the right type of operation and its parameters for performing manufacturing processes	Cognitive	4	2
3	Apply effectively various manufacturing techniques/operations in broad spectrum of engineering and manufacturing companies	Cognitive	3	2
4	Understand working of various machine tools and Manufacturing processes.	Psychomotor	3	5
5	Show concern and positive attitude towards instructions and team work	Affective	3	9
6	Knowledge of basis working principles and modern computational tools.	Cognitive	3	1

Mechanical Vibrations

CLO	Description	Domain	Taxonomy Level	PLO
1	USE different techniques to model vibrating systems for one/two/multi Degree of Freedom.	Cognitive	3	1
2	ANALYZE the physical parameters involved in natural frequency and system response to free and forced (harmonic) inputs.	Cognitive	4	2
3	CONSTRUCT engineering structures and mechanical systems under dynamic conditions.	Cognitive	6	3

4	PERFORM experiments on different types of equipment related to the vibration phenomenon and compare the results with theoretical formulas.	Psychomotor	5	4
5	SHOW concern and positive attitude towards discipline, team work and instructions	Affective	3	9
6	Acquire KNOWLEDGE about oscillations of different systems like simple and compound pendulum, damped and un-damped system frequencies of experimental data by computing derived quantities from the measured values	Cognitive	5	1

Mechatronics

CLO	Description	Domain	Taxonomy level	PLO
1	Explain various forms of open and close loop control systems, programs, sensors, actuators, microprocessors and controllers etc. for practical application	Cognitive	2	1
2	Analyze different sensors and actuators and Solve problems regarding sensors, actuators and signal conditioning	Cognitive	3	2
3	Programming for designing a control system in a micro-controller	Cognitive	5	5
4	Integrate knowledge of Mechanical, Electrical/Electronics and software for developing an open loop or close loop control system for automation and control	Cognitive	5	3
5	Work in group	Cognitive	5	9
6	Present project	Affective	3	10

SEMESTER-8

S. No	Course Code	Course Title	Credit Hours
1	ME4201	Internal Combustion Engines	(2-1-3)
2	ME4215	Renewable Energy Resources	(3-0-3)
3	ME4216	Total Quality Management	(3-0-3)
4	ME4312	Power Plant Engineering	(3-0-3)
5	ME4050	Project-II	(0-3-3)
		Total	(11-4-15)

Internal Combustion Engines

CLO	Description	Domain	Taxonomy level	PLO
1	Explain the basic knowledge, construction and working of various types of IC engines and its components.	Cognitive	2	1
2	Solve numerical problems related to the design and operation of IC engines.	Cognitive	3	2
3	Analyze different fuels	Cognitive	4	4
4	Analyze the design and operations of various engine systems and their the effect of engine on engine performance and emissions.	Cognitive	4	4
5	Analyze modern trends in engine design and their effect on emissions and environment	Cognitive	4	6 7
6	PERFORM experiments on different types of equipment's related to the engines phenomenon and compare the results with theoretical formulas	Psychomotor	4	5
7	SHOW concern and positive attitude towards discipline, team work and instructions	Affective	5	9
8	Acquire basic knowledge, construction and working of various types of IC engines and its components	Cognitive	3	1

Renewable Energy Resources

CLO	Description	Domain	Taxonomy level	PLO
1	Describe the fundamentals and main characteristics of renewable energy sources and their differences compared to fossil fuels.	Cognitive	2	1
2	Explain different energy resources and environmental impacts of power generation	Cognitive	2	7
3	Understand the energy efficiency, energy storage system and issues facing in renewable energy industry in Pakistan	Cognitive	2	5
4	Evaluate and select of renewable energy technologies in Pakistan	Cognitive	5	4

Total Quality Management

CLO	Description	Domain	Taxonomy Level	PLOs
1	To comprehend and explain concept of TQM and quality management principles with philosophies of quality Gurus	Cognitive	1	1
2	To predict and control the variation in quality using quality assurance procedures	Cognitive	2	2
3	To apply the principles learnt during subject of TQM for improvement in quality/efficiency in a given work environment using case study method	Cognitive	3	3
4	Demonstrates the ability to use and manage continuous improvement in industrial systems	Cognitive	3	4

Power Plant Engineering

CLO	Description	Domain	Taxonomy Level	PLO
1	Review different energy resources, environmental impacts of power generation and flue gas cleaning techniques.	Cognitive	2	7
2	Analyze strengths and weaknesses of different types of power plants by performing its thermodynamic calculations	Cognitive	4	2
3	Illustrate the construction and operation of different components of a power plant	Cognitive	4	2
4	Design of the major components or systems of a conventional or alternative energy power plant	Cognitive	5	3

