

Walchand Institute of Technology, Solapur.

Mechanical Engineering Department

Vision

- To produce world class globally competent distinguished graduates/ post graduates/ doctoral, Mechanical Engineers on the basis of their capabilities, dedication and work ethic and continuously strive towards societal development.

Mission

- To impart quality Mechanical Engineering education in accordance with the needs of the society.
- To produce globally competent Mechanical Engineers through research, industry institute interaction.
- To help Mechanical Engineering graduates to implement their acquired engineering knowledge for society and community development.

Program Educational Objectives (PEOs)

1. Graduate will excel in professional career in Mechanical and allied interdisciplinary areas.
2. Graduate will exhibit strong fundamentals required to pursue higher education and continue professional development in Mechanical and other fields.
3. Graduate will adhere to professional ethics, develop team spirit and effective communication skills to be successful leaders with a holistic approach.
4. Graduate will be sensitive to ethical, societal and environmental issues while serving at their professional work.

Program Outcomes:

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** 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.

11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Program Specific Outcomes:

1. Graduate will be able to design and develop mechanical equipments, devices and contrivances that would be able serve the society in a sustainable manner.
2. Graduate will be able to handle the problems associated with manufacturing of goods using latest technology and tools while ensuring productivity, quality and economy.
3. Graduate will be able to analyze complex problems related to IC engines, RAC equipments, Turbo Machines for improvement of performance.

SE Mechanical-I

C211 Analysis of Mechanical Elements

C211.1 At the end of this course, the student will be able to determine simple & critical stresses & strains in member subjected to different types of loads. (Axial, shear etc.)

C211.2 At the end of this course, the student will be able to draw distribution diagrams (S.F.D /B.M.D, shear & bending stresses) in determinate beams & various sections.

C211.3 At the end of this course, the student will be able to analyze behavior of structural members subjected to axial, shear, bending, & twisting loads.

C211.4 At the end of this course, the student will be able to find load resultant stresses, torsional strength, modulus of resilience variation in instantaneous elongation, slope & deflection

C211.5 At the end of this course, the student will be able to decide & design c/s, shape, and section shaft for different loads.

C 212 Applied Thermodynamics

C212.1 At the end of this course, the student will be able to apply knowledge of mathematics and science to solve real thermodynamics problems

C212.2 At the end of this course, the student will be able to calculate the efficiency of mechanical devices like boiler, compressor, steam turbine, etc.

C212.3 At the end of this course, the student will be able to apply knowledge of basic thermodynamic concepts such as temperature, pressure, work and heat, internal energy, enthalpy and entropy to systems.

C212.4 At the end of this course, the student will be able to design and analyze power producing devices used in practice such as boilers, turbines and engines.

C 213 Engineering Mathematics III

C213.1 At the end of this course, the student will be able to student can solve higher order linear differential equations and mechanical applications

C213.2 At the end of this course, the student will be able to student can solve linear and non-linear Partial differential equations



Course Outcome

C213.3 At the end of this course, the student will be able to determine potential function for irrotational force, gradient, divergence, velocity and acceleration of a vector.

C213.4 At the end of this course, the student will be able to perform data analysis using statistical methods

C213.5 At the end of this course, the student will be able to evaluate analytic function, Harmonic function and line integral

C214 Machine Tools and Processes

C214.1 At the end of this course, the student will be able to exhibit knowledge of conventional, unconventional & modern machining processes and machine tools.

C214.2 At the end of this course, the student will be able to select proper manufacturing process for the typical application

C215 Machine Drawing

C215.1 At the end of this course, the student will be able to create drawings as per BIS standards

C215.2 At the end of this course, the student will be able to apply technique for assembly drawing from the detail/components

C215.3 At the end of this course, the student will be able to incorporate limits, fits and tolerances for components on the working/engineering drawings

C215.4 At the end of this course, the student will be able to become Familiar in using drafting software

C216 Computer Programming in C++

C216.1 At the end of this course, the student will be able to develop algorithms for writing computer programs in C++.

C216.2 At the end of this course, the student will be able to write and edit scripts in C++ when using software that provide a C++ customization toolkit.

C216.3 At the end of this course, the student will be able to develop small computer programs that can function as equation solvers.



C217 Workshop Practice II

C217.1 At the end of this course, the student will be able to prepare a pattern.

C217.2 At the end of this course, the student will be able to prepare a sheet metal object

C217.3 At the end of this course, the student will be able to join metal parts by welding



SE Mechanical-II

C221 Theory of Machines-I

C221.1 At the end of this course, the student will be able to describe the basics of machines, mechanisms and power transmission

C221.2 At the end of this course, the student will be able to identify nature of Kinematic pairs, chains, mechanisms.

C221.3 At the end of this course, the student will be able to state/apply laws of friction, steering and theories of Uniform pressure and wear.

C221.4 At the end of this course, the student will be able to construct and analyze velocity and acceleration of links in mechanisms using different methods, cam profile, and drives.

C221.5 At the end of this course, the student will be able to operate and maintain machine and mechanism used in automobile, machine tools etc.

C222 Manufacturing Process

C222.1 At the end of this course, the student will be able to develop a sound knowledge of the various manufacturing processes.

C222.2 At the end of this course, the student will be able to choose the appropriate processes for manufacturing a product.

C223 Fluid Mechanics

C223.1 At the end of this course, the student will be able to use fluid properties & various laws related to fluids

C223.2 At the end of this course, the student will be able to solve the issues related to fluid statics

C223.3 At the end of this course, the student will be able to identify type of flow & calculate various flow parameters

C223.4 At the end of this course, the student will be able to apply the Bernoulli's equation to solve problems in fluid dynamics

C223.5 At the end of this course, the student will be able to perform dimensional analysis for research problems in fluid mechanics



Course Outcome

C223.6 At the end of this course, the student will be able to solve problems related to drag, lift, boundary layer theory

C224 Numerical Methods

C224.1 At the end of this course, the student will be able to evaluate the roots of non-linear equation

C224.2 At the end of this course, the student will be able to solve simultaneous linear and non-linear equations

C224.3 At the end of this course, the student will be able to fit a curve by statistical method and numerical methods

C224.4 At the end of this course, the student will be able to evaluate elliptic and parabolic PDE by finite difference methods

C224.5 At the end of this course, the student will be able to evaluate the definite integrals

C225 Electrical and Electronics Technology

C225.1 At the end of this course, the student will be able to select the electrical drives for different mechanical processes.

C225.2 At the end of this course, the student will be able to understand concept of electrical heating and welding.

C225.3 At the end of this course, the student will be able to analyze and design digital circuits.

C225.4 At the end of this course, the student will be able to use the microprocessor and microcontroller for different applications.

C225.5 At the end of this course, the student will be able to simulate above circuits using simulation software and can interpret results.



C226 Computer Aided Machine Drawing

C226.1 At the end of this course, the student will be able to use drafting software

C226.2 At the end of this course, the student will be able to apply computer graphics techniques/tools of 2D and 3D modeling for communicating effectively.

C226.3 At the end of this course, the student will be able to carry out applications using modern Engineering tools.

C227 Workshop Practice-III

C227.1 At the end of this course, the student will be able to calculate machine operating parameters.

C227.2 At the end of this course, the student will be able to machine a component as per the specifications and dimensions given in the engineering drawing

C227.3 At the end of this course, the student will be able to operate machine safely (follow SOPs).

C228 Environmental Studies

C228.1 At the end of this course, the student will be able to describe the natural environment and its relationships with human activities.

C228.2 At the end of this course, the student will be able to explain the ethical means and technological methods for sustainable management of environmental systems.

C228.3 At the end of this course, the student will be able to explain social, economical and legal policies involved in the resolution of environmental problems.



TE Mechanical-I

Theory of Machine II

C311.1 At the end of this course, the student will be able to select gears & gear trains as per requirement

C311.2 At the end of this course, the student will be able to design different types of gear trains

C311.3 At the end of this course, the student will be able to review turning moment diagram & design flywheel for various applications

C311.4 At the end of this course, the student will be able to analyze the effect of gyroscopic couple on different vehicles

C311.5 At the end of this course, the student will be able to perform balancing of rotary & reciprocating masses

C311.6 At the end of this course, the student will be able to solve the issues related to vibration & damping

C312 Heat and Mass Transfer

C312.1 At the end of this course, the student will be able to classify and identify Heat Transfer Mechanisms

C312.2 At the end of this course, the student will be able to represent mathematically Heat Transfer phenomenon.

C312.3 At the end of this course, the student will be able to calculate Heat transfer rate of a complex system.

C312.4 At the end of this course, the student will be able to identify Applications of extended surfaces.

C312.5 At the end of this course, the student will be able to analyze heat exchanges by LMTD and NTU methods

C312.6 At the end of this course, the student will be able to evaluate effect of convection coefficient and shape factor for radiation.



C313 Metallurgy

C313.1 At the end of this course, the student will be able to demonstrate the relevance of operation of physical metallurgy and its significance

C313.2 At the end of this course, the student will be able to apply their knowledge regarding selection of materials for engineering applications

C313.3 At the end of this course, the student will be able to demonstrate the heat treatment process and their applications in the field of automotive and machine tool industries.

C313.4 At the end of this course, the student will be able to get acquainted with advanced materials and their applications.

C314 Machine Design-I

C314.1 At the end of this course, student will be able to select the proper material for mechanical components

C314.2 At the end of this course, student will be able to explain Design Process.

C314.3 At the end of this course, student will be able to design Mechanical Components such as springs, shafts.

C314.4 At the end of this course, student will be able to analyze temporary and permanent joints

C314.5 At the end of this course, student will be able to estimate the fatigue life of the mechanical component.

C314.6 At the end of this course, student will be able to implement standardization in design of machine elements.

C315B Fluid Machinery and Fluid Power

C315B.1 At the end of this course, the student will be able to classify turbines and pumps.

C315B.2 At the end of this course, the student will be able to select water turbines, gas turbines & centrifugal pumps to meet the specific requirements

C315B.3 At the end of this course, the student will be able to represent velocity triangles for turbines and pumps.

C315B.4 At the end of this course, the student will be able to analyze different components of hydraulic and pneumatic systems.



Course Outcome

C315B.5At the end of this course, the student will be able to synthesize different hydraulic & pneumatic circuits needed for different applications.

C316A Self-Learning (HSS)

C316A.1At the end of this course, the student will be able to explain the concepts like Micro and Macro economics

C316A.2At the end of this course, the student will be able to determine Demand ratio and Production rate using different economics theories.

C316A.3At the end of this course, the student will be able to calculate national income and relationship between foreign exchanges.

C316E Self-Learning (HSS)

C316E.1At the end of this course, the student will be able to conduct research meeting the highest standards of honesty and clarity

C316E.2At the end of this course, the student will be able to identify the ethical elements in decisions and actions

C316E.3At the end of this course, the student will be able to address and resolve problems arising from questionable practice

C317 Advanced Computer Programming (JAVA)

C317.1At the end of this course, student will be able to Install JAVA IDE/SDK

C317.2At the end of this course, student will be able to read from and write to text and excel files and debug errors.

C317.3At the end of this course, student will be able to write JAVA applet for windows based applications such as Word & Excel and JAVA scripts for CAD software such as CATIA & AutoCAD.

C317.4At the end of this course, student will be able to develop a small JRE based application or Applet for a mechanical engineering subject.



C318 Workshop Practice-IV

C318.1 At the end of this course, the student will be able to machine work piece on lathe.

C318.2 At the end of this course, the student will be able to draw the part drawing

C318.3 At the end of this course, the student will be able to select proper gear trains for thread cutting



TE Mechanical-II

C321 Metrology and Mechanical Measurements

C321.1 At the end of this course, the student will be able to organize the setup of different instruments for accurate measurement.

C321.2 At the end of this course, the student will be able to describe the principle of operation and working of various gauges

C321.3 At the end of this course, the student will be able to explain applications of different measuring devices and equipment

C321.4 At the end of this course, the student will be able to design and develop simple measuring apparatus for measurement of dimensions and physical properties.

C321.5 At the end of this course, the student will be able to calibrate an instrument and can plot calibration curve using more accurate standards

C321.6 At the end of this course, the student will be able to use the different instruments for various industrial applications such as quality control, process control etc.

C322 Internal Combustion engines

C322.1 At the end of this course, the student will be able to recognize and understand the reasons for differences in the construction of different types of I C Engines.

C322.2 At the end of this course, the student will be able to differentiate operating characteristics of different engines.

C322.3 At the end of this course, the student will be able to select appropriate engine for a given application

C322.4 At the end of this course, the student will be able to conduct performance tests on engines and compare results with predictions.

C323 CAD/ CAM

C323.1 At the end of this course, the student will be able to handle CAD related problems from industries.

C323.2 At the end of this course, the student will be able to handle CAM related problems of manufacturing industries.



Course Outcome

C323.3 At the end of this course, the student will be able to learn CAD/CAM software to be updated with time.

C323.4 At the end of this course, the student will be able to design NC Part Programs to suit Industrial requirements.

C324 Machine Design-II

C324.1 At the end of this course, the student will be able to select the power transmission system

C324.2 At the end of this course, the student will be able to identify the elements of the power transmission system

C324.3 At the end of this course, the student will be able to design various Mechanical Elements such as gears, bearings

C324.4 At the end of this course, the student will be able to explain the optimum design process

C324.5 At the end of this course, the student will be able to implement standardization in design of pressure vessels

C325B Tool Engineering

C325B.1 At the end of this course, the student will be able to do the calculations involved in the mechanics & economics of operations.

C325B.2 At the end of this course, the student will be able to design & draw the tools & tooling for the given situation & operation.

C325B.3 At the end of this course, the student will be able to conceive & develop solutions, devices, contrivances to overcome present problems of the real world.

C326 Advanced Computing Technique (SCILAB)

C326 .1 At the end of this course, the student will be able to solve mathematical problems using Scilab and Plot 2D and 3D curves for mathematical problems.

C326 .2 At the end of this course, the student will be able to write Scilab code for various statistical applications.

C326 .3 At the end of this course, the student will be able to write Scilab Code for simple Image processing problems.



Course Outcome

C326 .4at the end of this course, the student will be able to solve simple transfer function control problems using Scicos tool.

C327 Workshop Practice V

C327.1At the end of this course, the student will be able to machine work piece on lathe.

C327.2At the end of this course, the student will be able to draw the part drawing

C327.3At the end of this course, the student will be able to select proper gear trains for thread cutting

C328 Self-Learning (Technical)

C328.1At the end of this course, the student will be able to identify technical problems

C328.2At the end of this course, the student will be able to use problem solving tools and simulation models to solve problems.



BE Mechanical-I

C411 Automatic Control Engineering

C411.1 At the end of this course, the student will be able to work confidently with Block Diagram Representations of Control System

C411.2 At the end of this course, the student will be able to use Laplace Transforms to describe Transfer Function of Engineering System and determine the time domain response to a wide range of inputs

C411.3 At the end of this course, the student will be able to solve transient control problems using root locus method by hand and in Matlab/Scilab.

C411.4 At the end of this course, the student will be able to solve Frequency response problems using Bode plots by hand and in Matlab/Scilab.

C412 Operation Research

C412.2 At the end of this course, the student will be able to apply various optimization techniques to industrial applications.

C412.2 At the end of this course, the student will be able to develop a project plan for the industry or organization.

C413 Refrigeration and Air Conditioning

C413.1 At the end of this course student will be able to classify conventional and non conventional refrigeration systems.

C413.2 At the end of this course student will be able to do performance evaluation of refrigeration and air conditioning systems.

C413.3 At the end of this course student will be able to design sustainable RAC systems.

C413.4 At the end of this course student will be able to select environment friendly refrigerants.



C414B Automobile Engineering

C414B.1 At the end of this course, the student will be able to demonstrate & explain various systems in an automobile

C414B.2 At the end of this course, the student will be able to describe importance and features of different elements like axle, differential, brakes, steering, suspension, wheel balancing etc.

C414B.3 At the end of this course, the student will be able to explain principle of operation, construction and applications of various sensors used in modern automobile

C414C Process engineering

C414C.1 At the end of this course, the student will be able to prepare the student for the knowledge of process planning decisions.

C414C.2 At the end of this course, the student will be able to prepare the student to design & develop an optimum process for a given component in a given situation.

C414C.3 At the end of this course, the student will be able to prepare the student to compare the processes on the basis of cost and processing time.

C415A Industrial Robotics

C415A.1 At the end of this course, the student will be able to solve forward and inverse kinematic equations for robot motion

C415A.2 At the end of this course, the student will be able to interface common sensors and actuators to robots

C415A.3 At the end of this course, the student will be able to implement software for control of robots such as Workspace LT

C415A.4 At the end of this course, the student will be able to implement simulation models in Matlab/Scilab

C415D Entrepreneurship Development

C415D.1 At the end of this course, the student will be able to avail various government facilities required to set-up small unit.

C415D.2 At the end of this course, the student will be able to prepare a project report for setting a small manufacturing or service unit.



Course Outcome

C415D.3At the end of this course, the student will be able to find the solutions for problems face by SMEs.

C416 Industrial Training

C416.1At the end of this course, the student will be able to work in formal supervised environment

C416.2At the end of this course, the student will be able to solve real time industry problems

C417 Project Work-I

C417.1At the end of this course, the student will be able to develop working prototypes /simulation models / Conduct extensive parametric research

C417.2At the end of this course, the student will be able to write literature review, progress reports and make presentations.

C417.3At the end of this course, the student will be able to work effectively in a team



BE Mechanical-II

C421 Industrial and Quality Management

C421.1 At the end of this course, student will be able to explain the Management concepts and Functions of Management

C421.2 At the end of this course, student will be able to identify the social responsibilities and ethics in Management

C421.3 At the end of this course, student will be able to analyze and apply the various management tools and techniques for solving Industrial problems

C421.4 At the end of this course, student will be able to use different skills such as communication, conceptual, interpersonal etc. during his job

C421.5 At the end of this course, student will be able to define quality and is able to explain various concepts related to quality and quality control.

C421.6 At the end of this course, student will be able to exhibit the knowledge of total quality management (TQM)

C422B Industrial Engineering

C422B.1 At the end of this course, the student will be able to analyze and measure productivity.

C422B.2 At the end of this course, the student will be able to perform method study and work measurement.

C422B.3 At the end of this course, the student will be able to develop improved method of working/process for manufacturing /service sector.

C423A Mechatronics

C423A.1 At the end of this course, the student will be able to develop State transition diagrams for control of physical systems

C423A.2 At the end of this course, the student will be able to interface common sensors and actuators to PC or microcontrollers

C423A.3 At the end of this course, the student will be able to implement software for control of Mechatronics systems

C423A.4 At the end of this course, the student will be able to implement control using PLCs



C423C Production and Operation Management

C423C.1At the end of this course, the student will be able to apply the principles and techniques used in production management.

C423C.2At the end of this course, the student will be able to solve the problems related to production.

C424C Plastic Engineering

C424C.1At the end of this course, the student will be able to select the plastic materials for particular end user application.

C424C.2At the end of this course, the student will be able to predict the structure and properties of different kind of plastic material.

C424C.3At the end of this course, the student will be able to know the processing of different plastic material based on the end user requirement.

C425 Project Work-II

C425.1At the end of this course, the student will be able to develop working prototypes /simulation models / Conduct extensive parametric research

C425.2At the end of this course, the student will be able to write literature review, progress reports and make presentations.

C425.3At the end of this course, the student will be able to work effectively in a team

C426 General Proficiency

C426.1At the end of this course, the student will be able to make power point presentation

C426.2At the end of this course, the student will be able to speak effectively on a topic

C426.3At the end of this course, the student will be able to use decision making tools

