Vision:

Build Professionals in the field of Production Engineering.

Mission:

M1: To impart quality technical education in Production and Industrial Engineering

M2: To inculcate sustainable managerial skills, research and learning attitudes, and social responsibilities

M3: To be committed to fulfil the needs of society in manufacturing and service sector

Program Educational Objectives (PEO's):

PEO1: Classify, analyse, evaluate, design and develop engineered system and processes using appropriate engineering tools and approaches.

PEO2: Demonstrate in-depth knowledge of manufacturing systems and work effectively in diverse environments.

PEO3: Build successful careers as per the need of Indian and multinational industries/companies.

Program Outcomes:

PO1: Engineering Knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature and analyze complex engineering problems researching substantiated conclusions using first principals of mathematics, natural science, and engineering sciences.

PO3: Design / development of solutions: Design solution 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.

PO4: 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.

PO5: 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 limitation.

PO6: 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.

PO7: Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9: Individual and team work: Function effectively as an individual and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, as such, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principals and apply these to one's own work, as member and leader in team, to manage projects and in multidisciplinary environment.

PO12: 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

PSO1: To be able to identify, formulate and develop solution methodology for various issues related to manufacturing processes.

PSO2: To be able to provide cost effective design solutions for various tools and dies in accordance with the manufacturing standards.

PSO3: To be able to apply effectively the automated production systems for overall productivity improvement.

Course Outcomes of all Semester's

S.E. Production Engineering (Pune University, 2019 Pattern) Sem-I

Subject 1: Engineering Mathematics III (207002)

At the end of this course, students will be able to

CO1: Solve higher order linear differential equations and apply to modelling and analysing mass spring systems.

CO2: Apply Laplace transform and Fourier transform techniques to solve differential equations involved in Vibration theory, Heat transfer and related engineering applications.

CO3: Apply statistical methods like correlation, regression analysis in analysing, interpreting experimental data and probability theory in testing and quality control.

CO4: Perform vector differentiation and integration, analyse the vector fields and apply to fluid flow problems.

CO5: Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations

Subject 2: Heat and Fluid Engineering (211101)

At the end of this course, students will be able to

CO1: Understand the basic principles and laws of fluid mechanics to recognize and analyses the type of fluid and fluid flow along with its application.

CO2: Develop the understanding of basic pressure measurement and its application in throughout fluid mechanics.

CO3: Analyse boiler and energy balance concept. Also understand the properties and behaviour of steam and different types of fuels.

CO4: Understand basic working principle and application of Vapour compression cycle, turbines And compressor and analyse its performance characteristics.

CO5: Perform individually or in a group to formulate and solve the engineering problem and to conclude the result of the outcome.

Subject 3: Mechanics of Materials (211102)

At the end of this course, students will be able to

CO1: Understand the concepts of stress and strain at a point as well as the stress-strain relationship for homogeneous, isotropic materials.

CO2: Understand the analysis and design the members subjected to tension, compression, torsion, bending and combined stresses using fundamental concepts of stress, strain and elastic behaviour of materials.

CO3: Understand the procedure of determining the stresses and strains in members subjected to combined loading and apply the theories of failure for static loading.

CO4: Understand analysis of slender, long columns and determine and illustrate principal

Stresses, maximum shearing stress and stresses acting on a structural member.

Subject 4: Welding and foundry (211103)

At the end of this course, students will be able to

CO1: Classify and describe welding processes.

CO2: Predict safety measures, inspection and testing of welding of welding.

CO3: Describe and classify metal casting process and casting defects.

CO4: Justify the pattern material, allowances, and effect of mould ingredients on mould strength.

CO5: Design the gating system and risers.

Subject 5: Material Science (211104)

At the end of this course, students will be able to

CO1: Explain the mechanism of plastic deformation

CO2: Define the mechanical properties of materials and conduct destructive and non-destructive tests to evaluate and test the properties of materials

CO3: Draw and explain equilibrium diagrams for various alloy systems

CO4: Understand various strengthening mechanisms

CO5: Describe various pyrometers with a neat sketch and explain their working and application

CO6: Understand corrosion and suggest various means to prevent corrosion

CO7: Explain various aspects of powder metallurgy

Subject 6: Machine Drawing & Computer Graphics Lab (211108)

CO1: Represent different kinds of materials and Mechanical components conventionally as per standards

CO2: Identify and indicate appropriate surface roughness, tolerances and fits on drawing of machine components

CO3: Identify the elements of a detailed drawing and produce the assembly drawing using part

Drawings.

CO4: Draw2D/3D models and assembly of machine elements using computer graphics

CO5: Prepare parametric programming of standard machine parts using Autolisp.

S.E. Production Engineering (Pune University, 2019 Pattern) Sem-II

Subject 1: Electrical Technology **(**203050**)**

At the end of this course, students will be able to

CO1: Understand and perform power measurement of single phase and three phases. Be able to understand the concept of Terrify and illumination

CO2: Describe and classify the types of single-phase transformer, tree phase transformer and three phase induction motor.

CO3: Describe and classify the types of single-phase induction motors and synchronous generators

CO4: Understand construction and working of DC motors, generators and servo and stepper motors.

CO5: Understand semiconductor devices and be able to predict their applications.

CO6: Predict the advantages of various electric drives and speed control.

Subject 2: Theory of Machines **(**211110**)**

After successful completion of the course students should be able to

CO1: Understand the basic knowledge of mechanism, their inversions, applications and velocity and acceleration analysis.

CO2: Understand the use of mechanical elements like drives, brakes, dynamometer in machine tools.

CO3: Understand theories of wear and friction, their effects, measurement and methods to minimize their effects in various mechanisms and machine tools.

CO4: Understand the static and dynamic force analysis of mechanisms.

CO5: Analyse experimentally mass moment of inertia and radius of gyration

Subject: 3 Machine Tool Operations **(**211111**)**

Course Outcomes: On successful completion of the course students should be able to-

1. CO1: Understand specifications, constructional features, and principle of working of various manufacturing processes
2. CO2: Identify and select appropriate cutting tools for various machining operations
3. CO3: Select/Suggest what process is best used for producing some product
4. CO4: Design simple process plans for parts and products.

Subject 4: Design of machine Elements **(**211112**)**

Course Outcomes: After learning this subject, the student will be able to:

CO1: Understand the basic principles and process of machine design

CO2: Analyse the stress and strain on mechanical components; and understand, identify and quantify failure modes for mechanical parts such as shaft, power screws, mechanical springs, gears, and bearings.

CO3: Demonstrate knowledge on basic machine elements used in design of machine elements to withstand the loads and deformations for a given practical application.

Subject 5: Engineering Metallurgy **(**211113**)**

Course Outcomes: After learning this subject, the student will be able to:

CO1: Work with Iron-Iron carbide equilibrium diagram and apply this knowledge for classification of steels from microstructure observations

CO2: Select proper Heat Treatment, Surface Hardening technique & Isothermal Treatments for the steels considering properties and service requirements

CO3: Distinguish different Alloy Steels and Cast Irons based on chemical compositions and microstructures

CO4: Familiarize with different types of non-ferrous alloys and Composites with their need, scope and applications

Subject 6: Production Practice -I **(**211116**)**

CO1: Operate various machines like lathe, milling etc.

CO2: Perform plain turning, taper turning etc. on lathe machine

CO3: Perform gear cutting operation on milling machine.

CO4: Understand the all gear drive, back gear mechanism of lathe.

CO5: Perform the forging operation for knife edge and Vee shape tool.

Subject 6: Audit Course 2: Environmental Studies **(**211118**)**

CO1: Comprehend the importance of ecosystem and biodiversity

CO2: To correlate the human population growth and its trend to the environmental degradation and develop the awareness about his/her role towards environmental protection and prevention

CO3: Identify different types of environmental pollution and control measures

CO4: To correlate the exploitation and utilization of conventional and non-conventional Resources

T.E. Production Engineering (Pune University, 2019 Pattern) Sem-I

Subject 1: Metrology and Quality Assurance **(**311081)

Course Outcomes: After successful completion of this course, the student will be able to

CO1: be able to describe and work with various linear and angular measuring devices

CO2: be able to design limit gauges and work with special measuring devices for gear, screw thread and surface finish measurements

CO3: be able to distinguish various comparators and use profile projector

CO4: be able to use various control charts and various quality assurance tools

CO5: get knowledge of various quality standards and their implementations in industries.

CO6: be able to implement TQM and TPM concepts in practice

Subject 2: Industrial Engineering and Management **(**311082)

Course Outcomes: Students will be able to

1. CO1: Summarize the contribution of peoples to management.
2. CO2: Differentiate between two employees on the basis of productivity.
3. CO3: Prepare time schedule to complete the task.

Subject 3: Material Forming **(**311083)

Student will be able to:

CO1: Students will understand mechanism of plastic deformation.

CO2: Students will classify and analyse various forming as well as special forming processes

CO3: Students will identify problems (defects) in forming processes and apply knowledge to overcome these problems

Subject 4: Kinematics of Manufacturing Machines **(**311084**)**

Course Outcomes: After successful completion of this course, the student will be able to

CO1: Perform kinematic synthesis, analysis of mechanisms.

CO2: Apply fundamentals of kinematics of machines this includes analysis of kinematics of gears, gear trains, cams etc.

CO3: Analyse kinematics of flywheels, the balancing of rotating and reciprocating masses

CO4: Evaluate effect of vibration and remedial actions.

Subject 5: Cutting Tool Engineering **(**311085**)**

Course Outcomes: Students will be able to

CO1: Understand the different cutting tool geometry and economics of machining

CO2: Calculate the cutting force components in orthogonal cutting

CO3: Understand, design and draw the different cutting tools

CO4: Understand the different principles of locating and clamping

CO5: Understand, design and draw the Jigs and fixtures and to understand environmental issues, decide manufacturing policies, various responsibilities of engineering professional etc.

T.E.Production Engineering (Pune University, 2019 Pattern) Sem-II

Subject 1: Production Management **(**311091)

Course outcomes: Student will be able to:

CO1: Demonstrate awareness and an appreciation of the importance and strategies for the Production and operations management to the sustainability of an enterprise.

CO2: Demonstrate a basic understanding of Production Systems and Production Planning and Control.

CO3: Demonstrate an awareness of the importance of facility layouts and implement in their In-Plant training project work.

CO4: Demonstrate an understanding of the principles of just-in-time systems.

CO5: Explain the importance of forecasting and demonstrate the ability to apply some mathematical forecasting techniques.

CO5: Demonstrate an understanding of the concept of operations scheduling.

CO6: Demonstrate an understanding of the problems involved in inventory management.

Subject 2: Numerical Techniques and Optimization Methods **(**311092**)**

Course outcomes: Student will be able to:

CO1: Apply numerical methods to production engineering problems

CO2: Develop mathematical model of physical problem and subsequent solution by appropriate optimization method

CO3: Design the database using ER model & work with relational algebra & relation calculus and to manage & control concurrent transactions using query process optimization & normalization

Subject 3: Machine Tool Engineering **(**311093**)**

Course outcomes: Students should be able to:

1. CO1: Classify and describe with a neat sketch the construction and working of various automats
2. CO2: Compare and contrast NC/CNC and conventional machine tools
3. CO3: Explain the objectives, principles and selection criteria of Material Handling Systems
4. CO4: Classify and describe various material handling equipment's.
5. CO5: Classify, compare and explain with neat sketches various non- conventional machining Processes.
6. CO6: Describe special processes used for manufacturing of gears and threads with a neat sketch
7. CO7: Explain meaning, considerations, types, and significance, as applicable, of installation, control, maintenance and reliability of machine tools.

Subject 4: Tool Design **(**311094**)**

Course outcomes: Students should be able to:

CO1: Students will understand various press working operations, plastic processing processes

CO2: Students will be able to apply knowledge for designing of Press tools, forging dies and Injection molds.

CO3: Students will be able to draw and construct the assembly of Press tools, forging dies and Injection molds.

Subject 5: Process Planning and Tool Selection **(**311095**)**

At the end of this course, students will be able to

CO1: Carry out Part print analysis of industrial component drawing

CO2: Design of Process sheet on GPM for batch production

CO3: Design of Process sheet for mass production

CO4: Compute time estimation for assembly using flow-charting techniques

CO5: Analyse and differentiate between Computer aided process planning

B.E.Production Engineering (Pune University, 2019 Pattern) Sem-I

Subject 1: Machine Tool Design **(**411081**)**

CO1: Design multi-stage gear box for machine tool applications

CO2: Design machine tool structures and element so machine tools such as bearings, powers crews, guide ways etc.

CO3: Perform the analysis of vibration and dynamic characteristics of machine tools

CO4: Design special purpose machine tools

Subject 2: Automation and Control Engineering **(**411082**)**

CO1: Understand basic concepts of industrial hydraulics and pneumatics

CO2: Design the hydraulic and pneumatic circuits for given application

CO3: Use microprocessor and programmable logic controller for soft automation.

CO4: Apply electric, electronics and computer control systems used in automation.

CO5: Apply various innovative methods for factory automation.

Subject 3: Operations Research **(**411083**)**

CO1: Know principles of construction of mathematical models of conflicting situations and methods of operations research

CO2: Be able to choose rational options in practical decision-making problems using standard mathematical models of operations research

CO3: Have skills in analysis of operations research objectives, mathematical methods and computer systems.

CO4: Use mathematical software to solve the proposed models.

CO5: Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

CO6: Be able to take decisions with a quantitative basis and improves quality of decisions.

Subject 4: Product Design and Development **(**411084-A**)**

CO1: Carry out the basic engineering design process and also various techniques used for a product.

CO2: Construct the product development process and customer requirements, QFD.

CO3: Evaluate the performance measure of design and DFM of a product.

CO4: Perform the case study of product life cycle management of a product

Subject 5: Financial Management and Costing **(**411084- B**)**

CO1: Use Financial Statements to evaluate performance of a firm

CO2: Calculate time value of money and Cost of Capital.

CO3: Demonstrate how materials, labor and overhead costs are added to a product at each stage of the production cycle.

CO4: Apply cost accounting techniques and evaluate their limitations;

CO5: Use and evaluate appropriate costing and decision-making techniques to make short term decisions;

CO6: Use standard costing systems to undertake a performance review and interpret the results

Subject 6: Data Analytics **(**411084-C**)**

CO1: Effectively visualize and interpret the data

CO2: Apply predictive and prescriptive techniques for production engineering applications

CO3: Use data analysis for engineering applications through the powerful tools of data application

Subject 7: Advanced Thermal Engineering **(**411084-D**)**

CO1: Apply laws of thermodynamics to devices viz. engines, refrigerators etc.

CO2: Analyse and compare air standard cycles, steam power cycles

CO3: Understand the principle of power generation system and devices used in steam power plant.

CO4: Understand and analyses basic modes of heat transfer

CO5: Explain the design, performance analysis and practical applications of heat exchangers

Subject 8 : Mechatronics **(**411084-E**)**

CO1: Understand the control system basics and the types of control systems

CO2: Apply knowledge of response specifications of control system.

CO3: Use controller principles for composite modes of control

CO4: Be Able to do PLC programming, programming with counters and timers, real time PLC programming examples.

CO5: Apply the Mechatronics system, actuators, sensors and transducers used digital signal processing in real life problems

Subject 9: Nano Manufacturing **(**411085-A**)**

CO1: Distinguish between micro and Nano manufacturing and identify the various finishing approaches.

CO2: Identify the applications of conventional and non-conventional manufacturing processes.

CO3: Distinguish various nano finishing processes.

CO4: Measure the micro and nano scales.

Subject 10: Simulation and Modeling **(**411085-B**)**

CO1: Solve the problems based on simulation principal

CO2: Differentiate the simulation systems.

CO3: Collect data and generate the random numbers.

CO4: Distinguish simulations with regard to output analysis

CO5: Apply simulation to manufacturing system.

CO6: Handle software package ARENA/SimFactory/Promote/ Witness

Subject 11: Additive Manufacturing **(**411085-C**)**

CO1: Identify the materials for used in additive manufacturing.

CO2: Identify the software for additive manufacturing and digitization techniques.

CO3: Identify industrial applications of liquid based additive manufacturing technology.

CO4: Identify industrial applications of solid based additive manufacturing technology.

CO5: Identify the industrial applications of powder based additive manufacturing.

CO6: Find applications of Bio-Additive Manufacturing- Computer Aided Tissue Engineering

Subject 12: Reliability Engineering **(**411085-D**)**

CO1: Identify and analyses the static and dynamic reliability of complex systems.

CO2: Identify commonly used reliability techniques using graphical techniques and empirical distributions.

CO3: Utilize common physical models for reliability analysis.

CO4. Perform reliability analysis of complete data.

CO5. Acquire ability to root cause, correct, and document system failures.

CO6. Implement accelerated and highly accelerated life testing analyses

Subject 13: Advanced Materials **(**411085-E**)**

CO1: Understand and possess the knowledge of working on materials.

CO2: Gain the knowledge of properties and applications of different materials

CO3. Select the appropriate material and prevent failure.

B.E.Production Engineering (Pune University, 2019 Pattern) Sem-II

Subject 1: Computer Integrated Design & Manufacturing **(**411091**)**

CO1. Apply geometric modelling principles to design a component

CO2. Use different transformation methods to solve problems in CAD

CO3. Appreciate the role of computers in manufacturing process and apply it in operation.

CO4. Combine different concepts to describe computer integrated manufacturing

CO5. Group similar parts and design FMS process

Subject 2: Industrial Robotics **(**411092**)**

CO1. Understand the motions of robotic arm and body which generates robot configuration.

CO2. Apply the techniques like Homogeneous transformation to understand direct and inverse kinematics.

CO3. Use design procedure for mechanical grippers depending upon their types and mechanism.

CO4. Understand different types of sensors and will be able to convert blank and white image from the given gray scale pattern.

CO5. Use different programming languages used to operate robot.

CO6. Identify application of robots in different areas where they will work in future.

Subject 3: Supply Chain Management **(**411093-B**)**

CO1. Build and manage a competitive supply chain using strategies, models, techniques and information technology.

CO2. Optimize supply chain network

CO3. Plan the demand, inventory and supply

Subject 4: Automobile Engineering **(**411093-C**)**

CO1. Understand Vehicle specifications, Chassis and safety.

CO2. Study of Fuel Supply System & Cooling System.

CO3. Understand Lubrication System and Ignition System.

CO4. Study of Clutches and Gear Boxes.

CO5. Understand Suspension and Steering System.

CO6. Understand Breaking Systems and Automobile Maintenance techniques.

Subject 5: Entrepreneurship **(**411093-D**)**

CO1. Appreciate the importance of embarking on self-employment and has developed the confidence and personal skills for the same.

CO2. Start a small business enterprise by liaising with different stake holders

CO3. Effectively manage small business enterprise.

Subject 6: Human Resource Management **(**411093-E**)**

CO1. Discuss strategic plan for the human resources needed to meet organizational goals and objectives

CO2. Define the process of job analysis and discuss its importance as a foundation for human resource management Practice

CO3. Compare and contrast methods used for selection and placement of human resources.

CO4. Describe the steps required to develop and evaluate an employee training program

CO5. Identify and explain the issues involved in establishing wage and compensation systems.

CO6. Summarize the activities involved in evaluating and managing employee performance

CO7. Explain how legislation impacts human resource management practice.

Subject 7: Intelligent Manufacturing System **(**411093-A**)**

Implement statistical methods, evolutionary optimization techniques, soft computing methods, machine learning and

Knowledge based system for manufacturing system applications such as:

1. Equipment selection and layout

2. Process planning and parametric optimization

3. Cellular manufacturing

4. Robotics systems

Subject 8: Energy Management **(**411094-B**)**

CO1. Identify areas of energy conservation in industries.

CO2. Identify role and responsibilities of an energy manager and energy auditor.

CO3. Analyse working of the energy utilizing and generating machines.

CO4. Practice and utilize the instruments in energy audit process.

CO5. Implement proper energy saving techniques in boiler, furnaces, compressors and heavy machineries.

Subject 9: World Class Manufacturing **(**411094-C**)**

CO1.Understanding recent trends in manufacturing

CO2.Customization of product for manufacturing

CO3.Implementation of new technology

Subject 10: Finite Element Analysis **(**411094-D**)**

CO1) Model and Analyse 1-D problem.

CO2) Model and Analyse Truss subjected to loading

CO3) Model and Analyse two-Dimensional Problem Using Constant Strain Triangles

CO4) Perform finite element modelling of triangular element and 2-D iso-parametric elements

CO5) Analyse steady state heat transfer - 1D and 2D heat conduction and convection

CO6) Identify meshing techniques quality aspects of meshing

Subject 11: Environmental Engineering **(**411094-E**)**

CO1. Understand importance of environment and different types of pollution

CO2. Explain causes and preventive measures against air pollution.

CO3. Describe causes and preventive measures against water pollution.

CO4. Explain causes and preventive measures against noise pollution.