



## Department of Production Engineering

### S.E. Sem III (R2016): Course Outcomes

#### PEC301 - APPLIED MATHEMATICS

Learners will be able to:	
PEC401.1	Demonstrate Laplace transforms and their properties, Use the convolution theorem and Solve differential equations using Laplace transforms.
PEC401.2	Follow analytic, harmonic functions, Milne Thompson's method, Conformal Mapping, Cauchy's theorem, Expand function using Taylor and Laurent series, and Residue Theorem.
PEC401.3	Follow expansion of functions in Fourier series, Complex form of Fourier series, Understand Orthogonal and orthonormal sets of functions
PEC401.4	Apply analytic and numerical methods for Partial Differential Equations, Heat equation, Two and Three dimensional Laplace equation.
PEC401.5	Learn Karl Pearson's and Spearman's Rank Correlation, lines of regression and Curve fitting.

#### PEC302 - APPLIED THERMODYNAMICS

Learners will be able to:	
PEC302.1	Understand and analyse the work and heat interaction associated with a prescribed process path and to perform the first law analysis of non-flow system.
PEC302.2	Understand and apply the steady-flow energy equation (First Law of Thermodynamics) to a system of thermodynamic components (turbine, pumps, compressor, boiler, heat exchanger etc.) to estimate required balances of heat, work and energy flow.
PEC302.3	Understand the importance of the second law of thermodynamics in the characterization of the processes and recognize the importance of entropy in the performance of the devices.
PEC302.4	Understand and recognize the importance of entropy in the performance of the devices.
PEC302.5	Understand the thermodynamic properties of pure substance and analyse vapour Power cycles.
PEC302.6	Analyse Gas Power cycles.



## Department of Production Engineering

### PEC303 - Manufacturing Engineering –I

Learners will be able to:	
PEC303.1	Get acquainted with various types of machine tools, classification, specification, constructional features, working and application areas.
PEC303.2	Get conversant with classification, capabilities, limitation and machining operation that can be performed on the lathe machine tool.
PEC303.3	Understand drilling and boring machines, illustrate with sketches the constructional features and describe the tooling and setup for drilling and boring operation.
PEC303.4	Get familiarized with various types of milling, shaping and planing machine tool, their classification, specification, constructional features and modes of operation. Also will get exposure to different types of milling cutter, their specification and sketches.
PEC303.5	State, classify and describe different machines along with their specification for manufacturing various types of screw thread and gears.
PEC303.6	Understand constructional features, specification, types and applications of grinding equipments and grinding wheel for various grinding requirements.

### PEC304 - MATERIAL SCIENCE & ENGINEERING

Learners will be able to:	
PEC304.1	Understand the process of solidification along with various crystal defects and also demonstrate the mechanism of deformation in crystalline materials.
PEC304.2	Identify and comprehend failure modes of engineering materials and related issues.
PEC304.3	Analyse various alloy phase diagrams and appreciate the significance of Iron-Iron Carbide phase diagram.
PEC304.4	Select and justify the proper heat treatment process for steel in order to obtain desirable properties to suit application requirements.
PEC304.5	Classify and describe engineering alloys with their properties and applications.
PEC304.6	Recognize the need for modern new age materials to cater to the engineering application demands.



## Department of Production Engineering

### PEC305 - MECHANICS OF SOLIDS

Learners will be able to:	
PEC305.1	Illustrate stress-strain behaviour of ductile and brittle materials under load.
PEC305.2	Understand and analyse behaviour of components with different cross sections under mechanical and thermal loads.
PEC305.3	Understand basic concepts pertaining to theory of bending and shearing and hence develop bending moment and shear force diagrams under different types of loading conditions.
PEC305.4	Develop skills to understand and interpret deflection in simply supported and cantilever beams under various loading patterns.
PEC305.5	Illustrate basic concepts of eccentric loading in components and their implications.
PEC305.6	Illustrate basic concepts of combined stresses and principal stresses due to axial loads, transverse loads, torsion, and buckling and strain energy.

### PEL301 - COMPUTER AIDED MACHINE DRAWING LABORATORY

Learners will be able to:	
PEL301.1	Prepare drawings depicting interpenetration of simple solids in simple positions and also 2D drawings inclusive of auxiliary views of standard machine components along with their conventional representations.
PEL301.2	Develop capability to read, interpret and prepare detailed and assembly drawings of production tools and machine subassemblies.
PEL301.3	Develop competency in preparation of working/production drawings of simple machine components and assemblies.
PEL301.4	Develop 3D models of machine components/assembled components and prepare computer generated drawings using CAD soft wares.
PEL301.5	Acquire capability in developing 3D models from simple physical assembled devices carrying out actual physical measurement of component dimensions.
PEL301.6	Develop a 3D model and derive from it assembly/detail drawings following reverse engineering approach.



## Department of Production Engineering

### PEL302 - DATABASE INFORMATION RETRIEVAL LABORATORY

Learners will be able to:	
PEL302.1	Apply fundamentals of DBMS and Design data models (like ER and EER) for given problem statement.
PEL302.2	Apply the features of database management systems and Relational database and design database constraints and access controls.
PEL302.3	Use SQL- the standard language of relational databases to implement database scheme and retrieve information.
PEL302.4	Understand the basic concepts of handling transactions in DBMS.
PEL302.5	Design applications using visual Basic as front end and DBMS as backend.

### PEL303 - MATERIAL TESTING LABORATORY

Learners will be able to:	
PEL303.1	Get familiarised with various test standards with respect to test specimen preparation, specimen conditioning and testing methods.
PEL303.2	Understand specifications of various testing equipment, their capabilities and selection for different testing.
PEL303.3	Demonstrate skill in performing different tests like tensile, compression, torsion and hardness test with different standard material specimens, prepare and interpret the test results.
PEL303.4	Understand various NDT methods and their implications.
PEL303.5	Understand significance of heat treatment and perform hardening and quenching operations.
PEL303.6	Prepare test specimens for micro-structure analysis and interpret the resulting micro-structure.

### PEL304 - MANUFACTURING ENGINEERING LABORATORY

Learners will be able to:	
PEL304.1	Understand and follow the standard machine shop practices and safe working.
PEL304.2	Understand the significance, constructional and control features and operations of the machine tools.
PEL304.3	Acquire the capability to select the right tool and machine tool set-up for machining.



## Department of Production Engineering

### S.E. Sem IV (R2016): Course Outcomes

#### PEC401 - APPLIED MATHEMATICS - IV

Learners will be able to:	
PEC401.1	Use matrix algebra with its specific rules to solve the functions of square matrix and system of linear equation.
PEC401.2	Understand vector differentiation, integration and apply these concepts for irrotational and solenoid force fields.
PEC401.3	Understand methods to solve Linear programming problem.
PEC401.4	Understand Discrete, continuous random variable and some standard distributions.
PEC401.5	Understand and apply the concept of sampling theory to Engineering problems.

#### PEC402 - DYNAMICS OF MACHINES

Learners will be able to:	
PEC402.1	Correlate the concept of kinematics with kinetics of rigid body and understand common mechanisms used in machines and gyroscopic devices.
PEC402.2	Determine the velocity and accelerations of various links in a mechanism.
PEC402.3	Get exposure to different types of cams and followers, their types of motion and areas of application and acquire skills to develop profiles of cams for such applications.
PEC402.4	Understand various types of gears, their terminology and areas of application. Students will be able to work on parameters pertaining to spur gears and also analyse different types of gear trains.
PEC402.5	Get exposure to basic concepts pertaining to balancing and vibrations and will develop skills in evaluating requirements for balancing of rotating and reciprocating machines and vibrations in simple machine components.
PEC402.6	Get familiarised with different types of clutches, brakes and dynamometers and acquire ability to evaluate the braking force.



## Department of Production Engineering

### PEC403 - MANUFACTURING ENGINEERING - II

Learners will be able to:	
PEC403.1	Get familiar with fundamentals of various non-conventional machining processes, their capabilities, limitations and application.
PEC403.2	Demonstrate the knowledge pertaining to sheet metal fabrication for joints with brazing, soldering and welding along with their trouble shooting.
PEC403.3	Illustrate the concept of foundry practices involving equipments, tools and process for metal casting and moulding along with trouble shooting.
PEC403.4	Acquire the knowledge of powder metallurgy process and their applications.
PEC403.5	Conversant with plastic and ceramic materials and their moulding techniques with trouble shooting guide.
PEC403.6	Acquire basic idea pertaining to polymer composites, their capabilities, applications and fabrication technologies.

### PEC404 - FLUID & THERMAL ENGINEERING

Learners will be able to:	
PEC404.1	Acquire capability to understand the basic fundamentals of fluid, fluid properties, flow behaviour and to analyse the fluid systems in static domain.
PEC404.2	Acquire capability to understand, analyse the application of mass, momentum and energy equation in fluid flow.
PEC404.3	Acquire capability to analyse flow of viscous fluid and evaluate major and minor energy losses in fluid flow through pipes.
PEC404.4	Get familiarised with different types of air compressors and their suitability for various applications.
PEC404.5	Be conversant with classification and application of gas turbine and also evaluate its performance.
PEC404.6	Understand basic concepts behind different modes of heat transfer and acquire knowledge base in computing heat transfer pertaining to simple applications.



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### PEC405 - ELECTRICAL & ELECTRONICS ENGINEERING

Learners will be able to:	
PEC405.1	Acknowledge the principles of operation and the main features of electric machines.
PEC405.2	Develop the concepts of Electronics used in the application of controlling electrical machines.
PEC405.3	Compare DC motor with AC motor.
PEC405.4	Utilize their knowledge of Electrical and electronics engineering in processing industries.
PEC405.5	Understand and comprehend application requirements for various types of motors (permanent magnet, brushless dc motor, induction motor, stepper motors).
PEC405.6	Study electronic devices and its applications.

### PEL401 - DYNAMICS OF MACHINES LABORATORY

Learners will be able to:	
PEL401.1	Compute the natural frequencies of helical spring.
PEL401.2	Study the gyroscopic effect and acquire the skill of computing the gyroscopic couple.
PEL401.3	Demonstrate the understanding of static and dynamic balancing of rotating masses in different planes.
PEL401.4	Compute velocity and acceleration in mechanisms and prepare velocity and acceleration diagrams using relative velocity and instantaneous centre approaches.
PEL401.5	Demonstrate the practical implications of interference in gears and approaches to tackle the same.
PEL401.6	Draw cam profile for different types of followers and follower motions.



## Department of Production Engineering

### PEL402 - FLUID & THERMAL ENGINEERING LABORATORY

Learners will be able to:	
PEL402.1	Acquire capability to understand the basic fundamentals of fluid, fluid properties, flow behaviour and to analyse the fluid systems in static domain.
PEL402.2	Acquire capability to understand and analyse the application of mass, momentum and energy equation in fluid flow.
PEL402.3	Acquire capability to analyse flow of viscous fluids and evaluate major and minor energy losses in fluid flow through pipes.
PEL402.4	Get familiarised with different types of air compressors, their specifications and suitability for various applications.
PEL402.5	Will set conversant with classification and application of gas turbines and also evaluate their performance.
PEL402.6	Get conversant with heat transfer phenomena and heat exchanger concepts and acquire ability to perform simple calculations pertaining to heat transfer.

### PEL403 - ELECTRICAL & ELECTRONICS ENGINEERING LABORATORY

Learners will be able to:	
PEL403.1	Study and understand about various characteristics curves like SCR, DIAC, and TRIAC.
PEL403.2	Design a OP-AMP integrator and differentiator.
PEL403.3	Study and understand the characteristics of dc generator and speed control of dc motor
PEL403.4	Study about R-RC Triggering circuits and its use.
PEL403.5	Design the Logic gates.
PEL403.6	Prepare various electronic characteristic curves.



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### PEL404 - MANUFACTURING PROCESS – II LABORATORY

Learners will be able to:	
PEL404.1	Get expose to machining of composite jobs involving different machining operations.
PEL404.2	Understand the significance of maintaining tolerance level while machining to facilitate assembly requirement.
PEL404.3	Understand the intricacies in carrying out various machining operations on vivid jobs and materials.



## Department of Production Engineering

### T.E. Sem V (R2016): Course Outcomes

#### PEC501 - DESIGN OF MOLD & METAL FORMING TOOLS

Learners will be able to:	
PEC501.1	Design and develop sand moulds depicting the components and general arrangement.
PEC501.2	Comprehend melting & pouring practices along with troubleshooting.
PEC501.3	Get exposed to special casting processes like pressure die casting, investment casting, shell mould casting, and composite mould casting etc along with application and troubleshooting.
PEC501.4	Get exposed to forging tools, forging practice, application areas & related troubleshooting.
PEC501.5	Understand rolling practices for sections, profiles & tubes and related troubleshooting.
PEC501.6	Get exposed to metal extrusion & metal forming technologies & their application areas.

#### PEC502 - OPERATIONS RESEARCH

Learners will be able to:	
PEC502.1	Understand the concept of linear programming & develop competency to use the concepts for solving specialized problems on transportation, assignments and sequencing.
PEC502.2	Understand principles of queuing, replacement & game theory models to solve real life problems.
PEC502.3	Understand how to model and solve problems like shortest path, minimum spanning tree, and maximum flow problems using dynamic programming.
PEC502.4	Understand different types of simulation models applicable to Inventory & Queuing models.
PEC502.5	Get familiarised with principles of network analysis and acquire skill in Identifying & Applying cost effective strategies in managing of manufacturing projects.



## Department of Production Engineering

### PEC503 - MACHINE DESIGN-I

Learners will be able to:	
PEC503.1	Apply basic principles and methodologies used for mechanical designing with adequate stress to design safety and standardisation.
PEC503.2	Design cotter, threaded and pinned joints.
PEC503.3	Design machine elements used in mechanical drives such as keys, shafts, couplings, springs etc.
PEC503.4	Design various mechanical fastening techniques using welding, riveting and bolting.
PEC503.5	Design machine components subjected to eccentric loading including curved beams.
PEC503.6	Design pressure vessels incorporating thick and thin cylinder concepts.

### PEC504 - CAD/CAM/CIM

Learners will be able to:	
PEC504.1	Understand and use computer graphics in design and its implications in various areas of applications.
PEC504.2	Identify and use proper modelling techniques for geometric modelling.
PEC504.3	Get adequate exposure to computer-aided manufacturing and its relevance in the modern context.
PEC504.4	Get familiarized with CNC programming and acquire capabilities for writing/selecting appropriate codes for performing various machining operations.
PEC504.5	Get exposure on basic CIM technology and its applications in automation and integrated manufacturing system.
PEC504.6	Understand the concept of FEA and develop capability to extend FEA as an approach in tackling real life problems in engineering.



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### PEC505 - METROLOGY & QUALITY ENGINEERING

Learners will be able to:	
PEC505.1	Identify, handle and operate precision instruments/Equipment and understand the significance & need for measuring instrument calibration
PEC505.2	Apply different techniques to inspect simple machined components for dimensional stability and functionality.
PEC505.3	Design Go and No Go gauges for quality monitoring of regular profile
PEC505.4	Identify and use proper SQC tools and other approaches in quality in various manufacturing/service problems
PEC505.5	Integrate quality in manufacturing interface to achieve for productivity improvement.
PEC505.6	Comprehend and appreciate ISO Quality standards in different manufacturing situation

### PEDLO5012 - FINITE ELEMENT ANALYSIS

Learners will be able to:	
PEDLO5012.1	Solve ordinary and partial differential equations using the Galerkin method.
PEDLO5012.2	Develop the finite element equations to model engineering problems governed by 2nd order partial differential equations.
PEDLO5012.3	Apply the basic finite element formulation techniques to solve engineering problems.
PEDLO5012.4	Use commercial FEA software, to solve problems related to engineering.
PEDLO5012.5	Prepare Solutions of 2 -D Problems using FEA Software.
PEDLO5012.6	Find solution techniques to Dynamic problems, longitudinal vibration, frequencies and mode shapes.



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### PEDLO5013 - PLASTIC ENGINEERING

Learners will be able to:	
PEDLO5013.1	Get exposure to various plastics materials, their moulding characteristics, application areas and principles of recycling & waste management.
PEDLO5013.2	Get familiarise with important processing techniques including fabrication with reinforced plastics along with various process parameters involved in each process and their influence on product quality.
PEDLO5013.3	Understand the significance of various auxiliary equipment & ancillaries used for plastic processing.
PEDLO5013.4	Understand mechanical behaviour of plastics, its implications in designing plastics products and use of thumb rules for designing plastics components.
PEDLO5013.5	Design simple moulds for compression moulding, injection moulding, blow moulding & dies for extrusion process.
PEDLO5013.6	Demonstrate trouble shooting skills in plastics processing.

### PEL501 - DESIGN OF MOLD & METAL FORMING TOOLS LABORATORY

Learners will be able to:	
PEL501.1	Get conversant with various forming and casting processes & their application.
PEL501.2	Get conversant with the specifications and selection of equipment/ machinery used in metal forming processes such as casting, rolling, forging, extrusion & wire drawing.
PEL501.3	Design and draw moulds for simple casting and pressure die casting processes.
PEL501.4	Design and draw forging dies.
PEL501.5	Get conversant with tooling for rolling processes.
PEL501.6	Get exposed to troubleshooting with metal casting and metal forming processes.



## Department of Production Engineering

### PEL502 - MACHINE DESIGN-I LABORATORY

Learners will be able to:	
PEL502.1	Explore various considerations to be made in mechanical designing.
PEL502.2	Make logical assumptions, select materials, factor of safety and stresses.
PEL502.3	Analyse probable modes of failure to perform the design task.
PEL502.4	Get familiarised with the use of design data books and various standard / codes of practices.
PEL502.5	Prepare production drawings pertaining to various designs.
PEL502.6	Appreciate design interface with various cases of manufacturing.

### PEL503 - CAD/CAM/CIM LABORATORY

Learners will be able to:	
PEL503.1	Perform geometric modelling based on computer graphics.
PEL503.2	Demonstrate data management, storage/retrieval through transforming/ manipulating objects.
PEL503.3	Perform CNC programming using NC-G codes and generate optimum CAM tool path for machining operations.
PEL503.4	Acquire skill in developing STL file from 3D modelling and apply additive manufacturing tools.
PEL503.5	Get familiarized with various software tools and solutions for analysing engineering components.



## Department of Production Engineering

### PEL504 - METROLOGY & QUALITY ENGG LABORATORY.

Learners will be able to:	
PEL504.1	Handle & operate precision measuring instruments /equipment's.
PEL504.2	Measure linear and angular measurements.
PEL504.3	Handle & operate comparator.
PEL504.4	Measure thread dimensions.
PEL504.5	Measure gear dimensions.
PEL504.6	Design Go and No Go gauges.

### PEL505 - BUSINESS COMMUNICATION & ETHICS LABORATORY

Learners will be able to:	
PEL505.1	Prepare a project report by assimilating, analysing, organizing and formatting data in the prescribed format.
PEL505.2	Prepare a technical proposal according to the prescribed format.
PEL505.3	Understand the various interpersonal skills and their function in an everyday business environment. Prepare an inventory of interpersonal skills based on self-assessment. Prepare notice agenda and minutes of a meeting and plan and conduct an effective meeting.
PEL505.4	Prepare notice agenda and minutes of a meeting and plan and conduct an effective meeting.
PEL505.5	Understand the concept and application of corporate ethics / soft skills in real life situations.
PEL505.6	Participate in group discussions and interviews and write a cover letter and resume. Apply presentation techniques to deliver power point presentations in the latest formats.



## Department of Production Engineering

### T.E. Sem VI (R2016): Course Outcomes

#### PEC601 - MACHINING SCIENCE AND TECHNOLOGY.

Learners will be able to:	
PEC601.1	Understand the theories and mechanics of metal cutting along with working principles of tool dynamometer and analyse the machining operation to compute various machining parameters and tool forces involved.
PEC601.2	Understand heat generation and its implications while metal cutting. Also get exposure to cutting coolants, their properties and selection.
PEC601.3	Get exposure to different cutting tool materials to suit specific application requirements and work piece finish.
PEC601.4	Comprehend failure modes of cutting tool, correlate and determine optimum process parameters to manage tool wear and tool life.
PEC601.5	Understand the cutting tool geometry and standard methods of designating the cutting tool as per ISO coding systems.
PEC601.6	Design simple single point and multipoint cutting tools.

#### PEC602 - PROCESS ENGINEERING AND TOOLING.

Learners will be able to:	
PEC602.1	Appreciate the significance of process engineering in manufacturing setup and develop ability to determine machine sequences to cater to the manufacturing requirements
PEC602.2	Develop capability in reading, understanding and analysing part prints.
PEC602.3	Understand the variables affecting manufacturing processes and develop skills in devising tooling & setup from work piece control & production.
PEC602.4	Appreciate need for tolerance control in designing & manufacturing and acquire capability in preparing tolerance control charts.
PEC602.5	Acquire capability in developing machining sequence and prepare process sheets.
PEC602.6	Develop capability in designing cams for part production on single spindle automats.



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### PEC603 - PRODUCTION TOOLING.

Learners will be able to:	
PEC603.1	Get familiarized with types and principles of locating and clamping devices and will be able to select location and clamp faces/points on work-pieces.
PEC603.2	Design and develop cost effective and productive fixtures for simple work-pieces.
PEC603.3	Design and develop cost effective and productive drill jigs for simple components.
PEC603.4	Understand different types of presses, their specifications and selection for various press tool requirements.
PEC603.5	Demonstrate constructional and design features of different types of press tool dies and ability to design and draw simple press tool dies for blanking, piercing, bending and drawing operations.
PEC603.6	Develop ability to perform simple calculations involved in design, tooling and setup for jigs, fixtures and press tools.

### PEC604 - MACHINE DESIGN – II

Learners will be able to:	
PEC604.1	Get familiarized with different types, application and selection of mechanical drive components like belts, chains, sprockets, gears, bearings (plane, journal & antifriction) & power screws.
PEC604.2	Design spur gears & gear boxes for catering to machine tool applications involving 2-3 stages and 4-12 spindle speeds.
PEC604.3	Get familiarized with different types of step-less drives, feed boxes, their applications and selection.
PEC604.4	Design power screws & clutches (single and multi-plate), selecting materials and other design parameters from standards and machine tool design hand books.
PEC604.5	Design and select journal bearings and antifriction bearing from design hand books/ bearing catalogues for various drive requirements.
PEC604.6	Understand constructional and design features of machine tool structures like types of slide/guide ways, columns. Also demonstrate the alignment tests/acceptance tests for machine test for machine tools like lathe, drilling, shaping and milling machines as per stipulated codes of practice.



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### PEC605 - PRODUCTION AND OPERATION MANAGEMENT.

Learners will be able to:	
PEC605.1	Understand implications of Production and Operations Management in industries.
PEC605.2	Describe the role of Production Management in creating competitive advantage for business organizations.
PEC605.3	Analyse various constituents of production operations in manufacturing and service.
PEC605.4	Plan and control various production related activities.
PEC605.5	Illustrate various inventory management procedures with the tools employed.
PEC605.6	Demonstrate role of JIT, MRP and ERP with their contribution towards Production and Operations Management.

### PEDLO6011 - MANUFACTURING PLANNING AND CONTROL

Learners will be able to:	
PEDLO6011.1	Analyse the implications of different aspects, pertaining to manufacturing, planning and control.
PEDLO6011.2	Get exposure to plan and envisage demand management scheme.
PEDLO6011.3	Get exposure to operation planning and sales forecasting techniques and also their relevance and evaluation.
PEDLO6011.4	Develop skills in capacity planning, scheduling, activity control and management for effective resource utilization.
PEDLO6011.5	Get familiarized with manufacturing, planning and control strategies and system design for reaching out to customers.
PEDLO6011.6	Get exposure to advanced material management concepts and their relevance such as MRP, ERP and JIT.



## Department of Production Engineering

### PEDLO6014 - Industrial Robotics

Learners will be able to:	
PEDLO6014.1	Illustrate the importance of robots and robotic systems in automation.
PEDLO6014.2	Select various sensors/robotic peripherals for deployment in a manufacturing systems.
PEDLO6014.3	Acquire skills in robotic language and programming.
PEDLO6014.4	Demonstrate the concepts of kinetics and dynamics of robot.
PEDLO6014.5	Acquire skill in robot intelligence & task planning for problem solving.
PEDLO6014.6	Identify and apply robotic systems in manufacturing fronts.

### PEL601 - MACHINING SCIENCE AND TECHNOLOGY LABORATORY.

Learners will be able to:	
PEL601.1	Get exposure to different types of tool dynamometers, their constructional/design features, operation and selection.
PEL601.2	Get exposed to tool signature & its implications. Also familiarized with milling cutter specification and selection for different milling process.
PEL601.3	Get familiarized with different cutting fluids, their composition and selection to suit specific machining operation.
PEL601.4	Get exposure to machining parametric optimization on machine tools using Taguchi's design of experiments.
PEL601.5	Understand tool geometry, design broach tool and prepare working drawing.
PEL601.6	Study tool geometry, design and draw flat and circular form tool.



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### PEL602 - PROCESS ENGINEERING AND TOOLING LABORATORY

Learners will be able to:	
PEL602.1	Develop capability in preparing part prints with manufacturing inputs.
PEL602.2	Develop work piece control techniques & system.
PEL602.3	Select tolerances on dimensions & positional tolerances and prepare tolerance control charts.
PEL602.4	Develop tool layout for a capstan turret and/or CNC machine tool.
PEL602.5	Develop process picture, process routing & process sheets.
PEL602.6	Design & draw Cams for part production on single spindle automats.

### PEL603 - PRODUCTION TOOLING LABORATORY

Learners will be able to:	
PEL603.1	Identify type of locator/clamp device and select location of clamping faces/points on work-pieces.
PEL603.2	Design and prepare working drawings of productive and cost effective fixtures for simple work-pieces.
PEL603.3	Design and prepare working drawings of productive and cost effective drill jigs for simple components.
PEL603.4	Understand and interpret press specifications and select press for sheet metal work with press tools/dies.
PEL603.5	Acquire skills in identifying and selecting materials for fabrication of jig/fixture and press tool components.
PEL603.6	Acquire skills in performing simple design calculations and accomplish tooling and setup for various machining processes and sheet metal works.



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### PEL604 - MACHINE DESIGN-II LABORATORY

Learners will be able to:	
PEL604.1	Get conversant with the use of hand books/ codes in designing machine tool drives and drive elements.
PEL604.2	Get familiarized with different machine tool beds, columns, & slide/guide ways, their selection and implications of up keeping through clearance adjustment and wear compensation techniques.
PEL604.3	Design and draw gear box components and layout involving spindle speeds 4-12 and speed reduction through 2-3 stages.
PEL604.4	Design belt drives and chain drives for various applications involving procedures/norms as stipulated by standards / codes of practice.
PEL604.5	Develop skills in designing power screws, clutches and bearings for machine tool drives.
PEL604.6	Perform different acceptance tests on machine tools like lathe, drilling, milling and shaping machines.



## Department of Production Engineering

### B.E. Sem VII (R2012): Course Outcomes

#### PEC701 - INDUSTRIAL TRAINING & PROJECT

Learners will be able to:	
PEC701.1	Get familiarized with various technological trends, approaches and applications along with managerial exposure.
PEC701.2	Demonstrate understanding of relevant application oriented subjects in a better perspective.
PEC701.3	Demonstrate understanding of various constraints of time and cost, within which goods are produced and services rendered in a specified quantum.
PEC701.4	Describe the scope, functions and job responsibilities in various departments of an organization.
PEC701.5	Develop a positive attitude, which will bring in a visible change in their approach while dealing with technical and interpersonal issues.

### B.E. Sem VIII (R2012): Course Outcomes

#### PEC801 - AUTOMATION & CONTROL ENGINEERING.

Learners will be able to:	
PEC801.1	Understand fundamentals of automation and apply automation techniques to manufacturing set-ups.
PEC801.2	Design and develop pneumatic and hydraulic control circuits of medium complexity.
PEC801.3	Understand fundamentals of digital logic control and differentiate between microcontroller and microprocessor.
PEC801.4	Illustrate the use of PLC in control systems.
PEC801.5	Model the system and check the stability of a mechanical system.



## Department of Production Engineering

### PEC802 - COMPUTER AIDED MANUFACTURING.

Learners will be able to:	
PEC802.1	Understand the concepts of NC, CNC, DNC & their hardware basics.
PEC802.2	Get familiarised with concepts and implications of control systems.
PEC802.3	Get exposed to CNC tooling for machining operations like turning, milling & drilling application.
PEC802.4	Get familiarised with CNC programming & will acquire capabilities of writing / selecting appropriate codes for performing particular tasks in CNC.
PEC802.5	Get exposed to basics of CIM technology & its application to modern manufacturing technology.

### PEC803 - ENGINEERING ECONOMICS FINANCE ACCOUNTING & COSTING.

Learners will be able to:	
PEC803.1	Understand and Correlate various micro and macro-economic variables.
PEC803.2	Get exposure to Economic policies and their implications.
PEC803.3	Get familiarized with the roles played by various financial institutions and banks.
PEC803.4	Get exposure to various business strategies, and their financial implications.
PEC803.5	Get familiarized with Account Management and Costing practices.

### PEC804 - TOTAL QUALITY STRATEGY.

Learners will be able to:	
PEC804.1	Identify and use proper quality tools in various manufacturing /service functions.
PEC804.2	Integrate quality approaches for productivity improvement.
PEC804.3	Realize the trade - off approach of quality and cost.
PEC804.4	Realize that quality should not be inspected, but should be inbuilt into the system.



## Department of Production Engineering

### PEC805 - INDUSTRIAL RELATION & HUMAN RESOURCE MANAGEMENT.

Learners will be able to:	
PEC805.1	Appreciate human resource as the most vital resource of an organization.
PEC805.2	Develop skills in identifying, planning, and deploying of man power.
PEC805.3	Develop inter personal, communication and soft skills.
PEC805.4	Develop skills in identifying training needs of employs at different levels.
PEC805.5	Able to understand legal aspects of employments.

### PEE8012 - LOGISTICS & SUPPLY CHAIN MANAGEMENT.

Learners will be able to:	
PEE8012.1	Understand the concepts, tasks and tools pertaining to Logistics and supply chain management in a factual and meaningful manner and appreciate the functional strategy map of supply chain and conceptualize and understand the ground mapping strategies of firms.
PEE8012.2	Understand the changes in business and supply chain strategy as business cycle change and its products proceed to different lifecycles. Develop a method to express and design the supply chain strategy of a firm.
PEE8012.3	Demonstrate an understanding of basic concepts and ideas related to materials Management. Get exposure to knowledge and learn patterns to contribute to growth and development of a firm.
PEE8012.4	Understand discipline and various aspects pertaining to logistics for any organisation, to know the vision of future of business logistics and its role in enterprise competitiveness.
PEE8012.5	Understand business logistics and its activities to move the product to and from and between members of a supply chain especially warehouses and transportation.
PEE8012.6	Understand how technology has and continues to change logistics and supply chain management. Outline computer and supply chain security measures. Describe documentation and terms of sale for domestics and international shipments. Identify the IT job skills and basics for employment success in various firms, where supply chain plays an integral part in organization's business.



## Department of Production Engineering

### PEC8018 - PRODUCT DESIGN & DEVELOPMENT.

Learners will be able to:	
PEE8018.1	Get familiarized with modern engineering & computer aided approaches practiced currently in designing and developing products.
PEE8018.2	Get exposed to thumb rule approaches and designing tips by interfacing related technology for designing and developing plastic component, cast metallic components, sheet metal and powder metallurgy components.
PEE8018.3	Address green expectation and design environment friendly products.
PEE8018.4	Develop competency in designing and developing products right from conceptual level, realising customer needs and incorporating cost effective solutions.
PEE8018.5	Acquire competency and confidence to venture into as a free-lance product designer.