Final Draft

Annexure-I

Following Course Outcomes (COs) have been established after the completion of each course.

Table -1 : List of the Course Outcomes (COs)

Semester	Course Details	COs Code	Course Outcomes (COs)
III (Theory)	PI 201A Mechanics Of Machine Tool Elements (PI)	PI 201A.1	Able to understand the compound stress, temperature stress, the concept of resilience & suddenly applied loads.
		PI 201A.2	Able to understand the advanced concept of shearing force diagram & bending moment diagram.
		PI 201A.3	Able to solve problems of beams under bending or torsion.
		PI 201A.4	Able to develop the concept of slope and deflection of beams.
		PI 201A.5	Able to solve problems pertaining to 2D principal stress & strains.
		PI 201A.6	Able to solve the loading problems on long and short columns.
	PI 202A Production Technology I (PI)	PI 202A.1	Able to understand the basic concept of metal casting and its different processes.
		PI 202A.2	Able to understand construction and operation of cupola furnace.
		PI 202A.3	Able to understand different types of press working processes and its various operations.
	PI 203A Material Science (PI)	PI 203A.1	Able to understand the strengthening mechanisms, fracture mechanism, and various type of hardness test.
		PI 203A.2	Able to understand the phase transformation, Iron-Carbon equilibrium diagram, T-T-T digram and heat treatment process.
		PI 203A.3	Able to understand the various heat treatment methods, heat treatment furnaces, and defects in heat treatments.
		PI 203A.4	Able to understand ferrous materials, non farrous metals and non-metallic materials.
	PI 204A Theory of Machines (PI)	PI 204A.1	Able to draw inversions and able to determine velocity and acceleration of different mechanisms.
		PI 204A.2	Able to construct different types of cam profile for a given data.
		PI 204A.3	Able to understand different types of gears, its classification and application.
		PI 204A.4	Able to identify different types of vibration, their causes and remedies.
	PI 205A Principles of Management (PI)	PI 205A.1	Able to understand overview of management and types of business organisations.
		PI 205A.2	Able to understand various function of organisations
		PI 205A.3	Able to understand overview of personnel, operation, financial and marketing management.
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs)**
III (Practical)	PI 211B Drawing of Machine Tool Components and Assemblies-I (PI)	PI211B.1	Able to understand the national and international standards pertaining to tool components and assemblies drawings.
		PI211B.2	Able to apply limits and tolerances to assemblies and choose appropriate fits.
		PI211B.3	Able to understand the manufacturing and surface finish symbols.
		PI211B.4	Able to create production drawings
		PI211B.5	Able to create assembly drawings.
	PI 212B Workshop Practice I (PI)	PI 212B.1	Able to familiarize with common manufacturing machines
		PI 212B.2	Able to understand manufacturing of simple components

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	PI 213B Computer Oriented Numerical Analysis Laboratory (CONA) (PI)	PI 213B.1	Able to familiar with numerical methods.
		PI 213B.2	Able to write programmes for various numerical methods.
		PI 213B.3	Able to solve real life problems using numerical methods.
	EE 214B Electrical Technology Laboratory (PI)	EE 214B.1	Able to conduct open circuit/ short circuit test on transformer
		EE 214B.2	Able to conduct experiments on Ac Machines to find the characteris
		EE 214B.3	Able to calculate torque and speed of given Machine.
	SE 215B Material Testing Laboratory (PI)	SE 215B.1	Able to prepare specimen for metallographic observation.
		SE 215B.2	Able to identify the microstructure of various metals.
		SE 215B.3	Able to understand various testing methods for materials
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs)**
IV (Theory)	PI 251 A Analysis & Design of Components (PI)	PI 251A.1	Able to design process, material selection, calculation of stresses and stress concentrations under variable loading.
		PI 251A.2	Able to design the solid, hollow shafts and to finding the critical speed
		PI 251A.3	Able to differentiate between rigid and flexible couplings and also the knuckle joints.
		PI 251A.4	Able to analyze bolted joints in eccentric loading.
		PI 251A.5	Able to examine the welded joints for vessels and steel structures also have design knowledge on sliding and rolling contact bearing.
		PI 251A.6	Able to understand of laminated springs and also in levers.
	PI 252A Production Technology-II (PI)	PI 252A.1	Able to understand the basic concept of gas welding and its role in manufacturing.
		PI 252A.2	Able to understand electric arc welding in detail.
		PI 252A.3	Able to understand different types of welding and their use.
		PI 252A.4	Able to understand classification and application of various machine tools.
	MA253A Engineering Mathematics & Statistics (PI)	ME 253A.1	Able to understand Integral transforms to solve the boundary value problems.
		ME 253A.2	Able to understand special functions and series solutions of differential equations
		ME 253A.3	Able to understand variables types of differential equations of variations.
		ME 253A.4	Able to understand statistical methods and data analysis.
	ME 254A Fluid Engineering and Heat Transfer (PI)	ME 254A.1	Able to analyze loads on structures surrounding static bodies of fluid.
		ME 254A.2	Able to apply fundamental fluid conservation equations to moving bodies of fluid.
		ME 254A.3	Able to understand on heat transfer and thermal losses in engineered systems.
	PI 291A Manufacturing Science (PI) (Open Choice Based Elective	PI 291A.1	Able to understand about primary manufacturing process.
		PI 291A.2	Able to understand about basic materials removal process.
		PI 291A.3	Able to understand about basic joining process and non convetional machining processes.

	– O.C.B.E.) (for students other than P&I)		
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs)**
IV (Practical)	PI 261B Analysis and Design of Components (PI)	PI 261B.1	Able to design process, material selection, calculation of stresses and stress concentrations under variable loading.
		PI 261B.2	Able to design the solid, hollow shafts and to finding the critical speeds.
		PI 261B.3	Able to differentiate between rigid and flexible couplings and also the knuckle joints.
		PI 261B.4	Able to analyze bolted joints in eccentric loading.
		PI 261B.5	Able to examine the welded joints for vessels and steel structures also have design knowledge on sliding and rolling contact bearing.
		PI 261B.6	Able to understand of laminated springs and also in levers.
	PI 262B Computer Aided Design Laboratory-I (PI)	PI 262B.1	Able to make students understand computer aided design concepts and popular software.
		PI 262B.2	Able to create simple drawings using a CAD software.
		PI 262B.3	Able to draw orthographic projects, sections and assembly.
	PI 263B Drawing of Machine Tool Components and Assemblies-II (PI)	PI 263B.1	Able to know and draw tool head of shaper assembly.
		PI 263B.2	Able to know and draw swivel bearing assembly.
		PI 263B.3	Able to know and draw drilling jigs.
		PI 263B.4	Able to know and draw spring loaded safety valve.
		PI 263B.5	Able to know and draw milling jigs.
	PI 264B Workshop Practice-II (PI)	PI 264B.1	Able to practice on machine tools and their operations.
		PI 264B.2	Able to practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
		PI 264B.3	Able to identify and apply suitable tools for machining processes including turning, facing, thread cutting and tapping.
	ME 265B Fluid Engineering and Heat Transfer Laboratory (PI)	ME 265B.1	Able to estimate the friction and measure the frictional losses in fluid flow.
		ME 265B.2	Able to experiment with flow measurement devices like venturimeter and orifice meter.
		ME 265B.3	Able to predict the coefficient of discharge for flow through pipes.
	Co-curricular Activities	PI 200E.1	Able to develop personality
		PI 200E.2	Able to promote hobbies of students
		PI 200E.3	Able to promote teamwork
ıester	**Course Details**	**COs Code**	**Course Outcomes (COs)**
V (Theory)	PI 301A Quality Engineering (PI)	PI 301A.1	Able to understand concept of quality,need of control chart, norr distribution curve, causes of variation.
		PI 301A.2	Able to understand & plot various quality control chart for variable attributes.
		PI 301A.3	Able to understand & plot OC curve.

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		PI 301A.4	Able to understand TQM, ISO9000, KAIZEN, COPQ, Bench mar reliability & learning by quality gurus.
	PI 302 A Work Study & Ergonomics (PI)	PI 302A.1	Able to calculate the basic work content of a specific job for emplo of an organization, to help calculate the production capacity of power of an organization.
		PI 302A.2	Able to analyze and calculate the level of risk in a job causing str fatigue and musculoskeletal disorders and Anthropometry appropri work systems.
		PI 302A.3	Able to rate a worker engaged on a live job and calculate normal a standard time for the same.
		PI 302A.4	Able to analyze the existing methods of working for a particular job an develop an improved method through questioning technique.
		PI 302A.5	Able to comprehend Principles of Motion Economy and to compute standard time using method time measurement (MTM), analysis o working, non-working through work sampling.
	PI 303A Production Technology III (PI)	PI 303A.1	Able to understand the basic process of manufacturing metal powders its processing and its various methods.
		PI 303A.2	Able to develop the concept of basic mechanism of metal cutting and the effect of various parameters/ factors on metal cutting process.
	ME 304A Thermal Engineering (PI)	ME304A.1	Able to define the fundamentals of the first and second laws of thermodynamics and explain their application to a wide range of systems
		ME304A.2	Able to analyze the work and heat interactions associated with a prescribed process path and to perform a analysis of a flow system
		ME304A.3	Able to evaluate entropy changes in a wide range of processes and determine the reversibility or irreversibility of a process from such calculations
	PI 341A Quality Management (PI) (Open Choice Based Elective – O.C.B.E.) (for students other than P&I)	PI 341A.1	Able to understand concept of quality, normal distribution curve, and causes of variation.
		PI 341A.2	Able to understand & plot various quality control chart for variable and attributes.
		PI 341A.3	Able to understand & plot OC curve.
		PI 341A.4	Able to understand quality management system, various clauses of ISO 9000, and other QM techniques.
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs)**
V (Practical)	PI 311B Computer Aided Design Laboratory-II (PI)	PI 311B.1	Able to understand lifecycle of a product and the role of computer-aided design (CAD) in product development.
		PI 311B.2	Able to describe the concepts of geometric and solid modelling.
		PI 311B.3	Able to visualize geometric models through animation and transform them into real world systems.
		PI 311B.4	Able to sketch, construct and simulate the mechanical engineering parts and components which include shaft coupling, bearings, automobile parts, machine tool parts along with their assembly drawing in a CAD package.
	PI 312B Design of Machine	PI 312B.1	Able to describe the design process, material selection, calculation of stresses and stress concentrations under variable loading.

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	Tool Components & Assemblies (PI)	PI 312B.2	Able to understand design of solid, hollow shafts and to finding the critical speeds.
		PI 312B.3	Able to examine the welded joints for vessels and steel structures also have a design knowledge on sliding and rolling contact bearing.
		PI 312B.4	Able to understand design of I.C. Engine components.
	PI 313B Production Engineering Laboratory-I (PI)	PI 313B.1	Able to develop the capacity chart of Lathe machine, demonstration of internal square threads on lathe, fixing of gear train for different TPI and prepare of job on Lathe.
		PI 313B.2	Able to understand the various measuring instruments and their uses for engineering application.
	PI 314B Industrial Engineering Laboratory-I(PI)	PI 314B.1	Able to understand the process, data collection and presentation
		PI 314B.2	Able to understand the fundamental concept of quality control and work study.
	ME 315B Thermal Engineering Laboratory (PI)	ME 315B.1	Able to compute the property of fuels and lubricating oils using suitable tests.
		ME 315B.2	Able to demonstrate the performance of internal combustion engines and air compressors.
		ME 315B.3	Able to interpret the emission characteristics of internal combustion engines.
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs)**
VI (Theory)	PI 351A Engineering Metrology (PI)	PI 351A.1	Able to understand basic concepts of metrology.
		PI 351A.2	Able to understand working of various dimensional metrology gauges and measuring devices.
		PI 351A.3	Able to design limit gauges.
		PI 351A.4	Able to understand advanced mesurement instruments.
	ME 352A Process Instrumentation Control (PI)	ME 252A.1	Able to understand and able to analyze and select electric circuit components including current and voltage sources, resistance, inductance, capacitance, and operational amplifier.
		ME 252A.2	Able to understand the basic measuring devices including transformers, transducers, and pressure, flow rate, and temperature measurement devices.
		ME 252A.3	Able to understand the methods for rating instrument devices including dynamic range, resolution, accuracy and precision, bandwidth.
	PI 353A Production Technology IV (PI)	PI 353A.1	Able to develop the understanding of the conventional machining process such as milling, broaching & grinding.
		PI 353A.2	Able to understand various metal-cutting semi-automats & automats machine tools such as milling machines, broaching machines , grinding machines & turning machines.
		PI 353A.3	Able to understand the concept of manufacturing shafts, screw threads & gears by various methods.
	PI 354A Operations Research	PI 354A.1	Able to learn various techniques of Operations Research (OR).
		PI 354A.2	Able to learn and apply the OR techniques to model and apply real world industrial problems.
		PI 354A.3	Able to learn to model and apply theory of waiting line, theory of games and bidding problems.
		PI 354A.4	Able to learn to model and apply inventory control and simulation

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			techniques.
	PI 391A Principles Of Management & Economics (PI) (Open Choice Based Elective – O.C.B.E.) (for students other than P&I)	PI 391A.1	Able to understand management function & principles.
		PI 391A.2	Able to understand creation & dissolution of various type organisation
		PI 391A.3	Able to understand significance of personnel management, econo analysis, financial, operation & marketing management.
	PI 392A Intellectual Property Rights (PI) (Open Choice Based Elective – O.C.B.E.) (for students other than P&I)	PI 392A.1	Able to understand significance & importance of various form of Intellectual Property Rights (IPR'S).
		PI 392A.2	Able to understand role of world intellectual property organization (WIPO) & trade related aspects of intellectual property rights (TRIPS)
		PI 392A.3	Able to understand Indian patent act 1970, and other acts protect IPR in India.
		PI 392A.4	Able to understand various aspects of IPR management.
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs)**
VI (Practical)	PI 361B Entrepreneurship Development (PI)	PI 361B.1	Able to understand distinct entrepreneurial traits.
		PI 361B.2	Able to know the parameters to assess opportunities and constraints for new business ideas.
		PI 361B.3	Able to understand the systematic process to select and screen a business idea.
		PI 361B.4	Able to design strategies for successful implementation of ideas.
		PI 361B.5	Able to understand and write a business plan.
	PI 362B Industrial Engineering Laboratory-II (PI)	PI 362B.1	Able to understand process problem solving techniques.
		PI 362B.2	Able to analysis the concept of quality control and work study
	PI 363B Production Engineering Laboratory-II (PI)	PI 363B.1	Able to understand vertical and universal milling machine and use of universal indexing head and cutting of spur & helical gear.
		PI 363B.2	Able to understand development of microstructure for ferrous & non-ferrous alloys, powerpress, eriction meter, single point cutting tool and eccentric turning.
		PI 363B.3	Able to understand capton lathe and measurement of standard time in machining a component on it.
	ME 364B Process Instrumentation & Control Laboratory (PI)	ME 364B.1	Able to apply acquired engineering knowledge to analyses, assess and solve common process control and instrumentation problems
		ME 364B.2	Able to understand industrial control and instrumentation engineering problems
		ME 364B.3	Able to utilise appropriate control engineering and instrumentation documentation and standards.
		ME 364B.4	Able to install, configure and operate control and instrumentation equipments.
	PI 365B Product Design	PI 365B.1	Able to identify and analyze various stages of product design and development processes in manufacturing and service industries.

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	Laboratory (PI)	PI 365B.2	Able to analyze, evaluate, and apply the methodologies for product design, development and management.
		PI 365B.3	Able to undertake methodical approaches to the management of product development to satisfy customer needs.
		PI 365B.4	Able to be familiar with Intellectual Property Rights for the designed and developed products
	Co-curricular Activities	PI 300E.1	Able to develop personality
		PI 300E.2	Able to promote hobbies of students
		PI 300E.3	Able to promote teamwork
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs)**
VII (Theory)	PI 401A Automation & Computer Aided Manufacturing (PI)	PI 401A.1	Able to understand the basic concepts of computer aided manufacturing.
		PI 401A.2	Able to design and development NC machine part programs.
		PI 401A.3	Able to write robot programs.
	PI 402A Production Technology V (PI)	PI 402A.1	Able to understand the basic principles of metal forming viz. Hooke's law, yield criteria, slip line field theory, Hodographs etc.
		PI 402A.2	Able to understand process of drawing and extrusion with their analysis and application in detail.
		PI 402A.3	Able to understand process of forging and rolling processes with their analysis and application in detail.
	PI 403A Plant Engineering (PI)	PI 403A.1	Able to understand efficient way to decide plant location & plant layout type.
		PI 403A.2	Able to understand building of optimal plant layouts.
		PI 403A.3	Able to understand the principles of material handling and details of various material handling equipment.
		PI 403A.4	Able to understand concepts of maintenance management.
	PI 404A Tool Design-I (PI)	PI 404A.1	Able to design single point cutting tools.
		PI 404A.2	Able to understand the characteristics of tool material and should be able to select appropriate material for tools and dies.
		PI 404A.3	Able to understand the manufacturing processes for : a)tipped tools; b) twist drills & c) plain milling cutter and form tools.
		PI 404A.4	Able to design of jigs- fixtures by using the principles of locating and clamping.
		PI 404A.5	Able to design basic inspection fixtures for checking parallelism, perpendicularity, flateness and roundness.
	PI 405A Production & Operations Management-I (PI)	PI 405A.1	Able to understand various aspect of Production Planning & Operations Management, concept of operation scheduling, line balancing, sequencing theory.
		PI 405A.2	Able to develop various qualitative and quantitative forecasting models.
		PI 405A.3	Able to plan product analysis & process using bill of materials & route sheets.
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs) statement**

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VII (Practical)	PI 411B Computer Aided Machining Laboratory-I (PI)	PI 411B.1	Able to familiarize students with CAM software
		PI 411B.2	Able to create CNC machine programmes using CAM software.
		PI 411B.3	Able to understand the CNC programme verification using softwar
	PI 412B Production Engineering Laboratory-III (PI)	PI 412B.1	Able to calibrate and measurment of forces using 2D L dynamometer.
		PI 412B.2	Able to understand the effect of rack angle on chip thicknes ratio shear angle in orthogonal cutting.
		PI 412B.3	Able to understand the working of tool maker micron.
		PI 412B.4	Able to understand machinability and study of power measurement o milling machine.
	PI413B Industrial Engineering Laboratory-III (PI)	PI 413B.1	Able to two hand and one hand process chart for pin-board assembly.
		PI 413B.2	Able to plot moving range and moving average chart for a given lot.
		PI 413B.3	Able to plot OC curve for single sampling plan & finding AQL fo given lot size.
	PI 414B Simulation Laboratory (PI)	PI 414B.1	Able to model and study a given manufacturing scenario using simulation.
		PI 414B.2	Able to analyze the behaviour of manufacturing system using simulation.
		PI 414B.3	Able to evaluate and compare different manufacturing control policies using simulation
	PI 415D Seminar (PI)	PI 415B.1	Able to identify and compare technical and practical issues related to the area of course specialization.
		PI 415B.2	Able to outline annotated bibliography of research demonstrating scholarly skills.
		PI 415B.3	Able to prepare a well-organized report employing elements of technical writing and critical thinking
		PI 415B.4	Able to demonstrate the ability to describe, interpret and analyze technical issues and develop competence in presenting.
Semester	**Course Details**	**COs Code**	**Course Outcomes (COs) statement**
VIII (Theory)	PI 452A Production & Operations Management-II (PI)	PI 452A.1	Able to solve problems of material management, purchase management & inventory management.
		PI 452A.2	Able to solve PERT, CPM and network analysis problems.
		PI 452A.3	Able to understand various Production Control techniques.
		PI 452A.4	Able to understand the concept of Supply Chain Management, Business Process Re-Engineering, Group Technology & Management Information System (MIS) and Lean Management.
	PI 453A Tool Design-II (PI)	PI 453A.1	Able to understand the concept of forging die design and able to design simple upsetting dies.
		PI 453A.2	Able to design die blocks & punches for sheet metal press-work.
		PI 453A.3	Able to comprehend design concepts of strippers, knock-outs, stops and to design efficient scrap strip layout.
		PI 453A.4	Able to design of bending dies for simple components.
		PI 453A.5	Able to design the drawing die and understand the concept of progressive dies and combination dies for common objects.
	PI 454 A Production	PI 454A.1	Able to understand the concept of Un-conventional / non-traditional machining methods such as USM, AJM, AWJM, WJM, ECM, CHM.

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Technology VI (PI)		EDM, EBM, LBM & PAM.
	PI 454A.2	Able to understand the concept of non-destructive testing of materials, products, structure, Assembly sets & its various methods.
PI 455A: Supply Chain Management (PI)	PI 455A.1	Able to comprehend basic concepts of supply chain management (SCM), global optimization, uncertainity, inventory management, risk pooling.
	PI 455A.2	Able to understand the value of information and supply chain intrigation.
	PI 455A.3	Able to comprehend strategic allineces, Procucurement and out sourcing strategies.
	PI 455A.4	Able to understand role of information technology in SCM, Decision Support System (DSS) and performance measurement for SCM.
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PI 451A (a) Marketing And Financial Management (PI) (Elective)	PI 451A.1	Able to know basic function of marketing and understanding of marketing research and consumer behaviors.
	PI 451A.2	Able to understand sales promotion, personal selling, distribution channel, policies & their strategies.
	PI 451A.3	Able to understand organisational structure of financial management operation and various methods of financial analysis & control.
	PI 451A.4	Able to understand the working capital management, cost of capitaland capital budgeting.
PI 451A(b) Modern Machining Methods (PI) (Elective)	PI 451A.1	Able to understand the classification scheme of modern (unconventional) machining process.
	PI 451A.2	Able to understand the working of mechanical processes such as AJM,WJM,USM, AWJM.
	PI 451A.3	Able to understand the working of elector-chemical processes (ECM, ECG)
	PI 451A.4	Able to understand the working of chemical processes (CHM, CHE)
	PI 451A.5	Able to understand the working of electro-thermal processes (EDM, EBM, LBM, PAM)
PI 451A (c) Welding Engineering (PI) (Elective)	PI 451A.1	Able to understand welding process and its classification.
	PI 451A.2	Able to understand the coding of welding electrode.
	PI 451A.3	Able to understand the electric arc welding, various types of metal transfer and metallurgical aspects.
PI 451A (d) Foundry Engineering (PI) (Elective)	PI 451A.1	Able to describe moulding, casting and solidification processes
	PI 451A.2	Able to know various furnaces used in the production of metals and alloys.
	PI 451A.3	Able to identify inspection of casting product.
PI 451A (e) Computer Aided Design(PI) (Elective)	PI 451A.1	Able to make students familiar with computer aided design.
	PI 451A.2	Able to perform basic sketching techniques i.e. application of commands.
PI 451A (f) Robotics &	PI 451A.1	Able to understand robotics, robotics anatomy and its perioherals.
	PI 451A.2	Able to design robot drive system and robot programming.

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	Soft Computing (PI) (Elective)	PI 451A.3	Able to understand involvement of artificial intelligence in the design advanced robot.
		PI 451A.4	Able to understand the soft computing and fuzzy logic
		PI 451A.5	Able to Apply GA, PSO and ACO algorithms for problems in scheduling, process planning, layout design and neural network.
	PI 451A (g) Computer Aided Process Planning (PI) (Elective)	PI 451A.1	Able to understand the fundamentals of developing process plans based on design information.
		PI 451A.2	Able to select manufacturing processes and parameters to enable process plan development.
		PI 451A.3	Able to use computer aided methodologies for process plan development.
		PI 451A.4	Able to appreciate the effect of design changes on the manufacturing ability of the product.
	PI 451A (h) Simulation (PI) (Elective)	PI 451A.1	Able to understand basic concepts of discrete and continuous simulation.
		PI 451A.2	Able to design & develop simulation programme.
		PI 451A.3	Able to develop simulation models in modern simulation softwares.
	PI 451A(i) Finite Element Method (PI) (Elective)	PI 451A.4	Able to present some basic theory of FEA.
		PI 451A.5	Able to understand the general procedures that are necessary to carry out an analysis.
		PI 451A.1	Able to present basic information that is necessary for the safe use of FEA.
	PI 451A (j) Operations Research II (PI) (Elective)	PI 451A.1	Able to solving revised simplex method, duality, sensitivity analysis and integer programming.
		PI 451A.2	Able to use application of Dynamic Programming to engineering problems and to do the simulation.
		PI 451A.3	Able to optimize the non-linear function of single variable and several unconstrained variables.
		PI 451A.4	Able to solve Quadratic and Geometric Programming problems with their engineering applications.
	PI 451A (k) System Engineering (PI) (Elective)	PI 451A.1	Able to understand the concept and types of systems under management information system.
		PI 451A.2	Able to understand the technical engineering discipline knowledge and whole-of-system methodologies to improve outcomes for a real-world client in a team environment.
		PI 451A.3	Able to know System Dynamics and Man-Machine Systems.
	PI 451A (l) Productivity Engineering (PI) (Elective)	PI 451A.1	Able to acquire fundamental knowledge and understanding of Value Engineering.
		PI 451A.2	Able to know basic concepts of productivity and able to develop the total productivity model.
		PI 451A.3	Able to measure productivity and develop the Sumanth's Five-pronged productivity improvement models.
	PI 451A (m) Personnel Management And Industrial Relations (PI) (Elective)	PI 451A.1	Able to know the personnel function and its evolution, objectives, principles, philosophies. duties and responsibilities.
		PI 451A.2	Able to understand manpower planning, recruitment process and basic compensation.
		PI 451A.3	Able to know labour related acts and industrial dispute act.

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	PI 451A (n) Management Information System (PI) (Elective)	PI 451A.1	Able to understand the usage, function and issues of MIS in organization.
		PI 451A.2	Able to understand the different information systems technology.
		PI 451A.3	Able to understand the data base management system (DBMS) and decision support system (DSS).
		PI 451A.4	Able to understand MIS in the fuctional area of business.
	PI 451A (o) Intellectual Property Rights (PI) (Elective)	PI 451A.1	Able to understand significance & importance of various form of Intellectual Property Rights (IPR'S).
		PI 451A.2	Able to understand role of world intellectual property organization (WIPO) & trade related aspects of intellectual property rights (TRIPS)
		PI 451A.3	Able to understand Indian patent act 1970, and other acts protect IPR in India.
		PI 451A.4	Able to understand various aspects of IPR management.
Semester	**Course Details**	**COs Name**	**Course Outcomes (COs) Statement**
VIII (Practical)	PI 461B Industrial Engineering Laboratory – IV (PI)	PI 461B.1	Able to study and practice bear game
		PI 461B.2	Able to do self rating, group rating in walking
		PI 461B.3	Able to conduct pareto analysis, plot causes and effect diagram and identify the most critical defects in a given lot of casting
	PI 462B Operations Management Laboratory (PI)	PI 462B.1	Able to evaluate a variety of theories and concepts relating to supply chain management.
		PI 462B.2	Able to familiarizes with MRP and SAP systems.
		PI 462B.3	Able to get familiarize with MS projects.
	PI 463B Production Engineering Laboratory –IV (PI)	PI 463B.1	Able to conduct and understand alignment test on lathe, drilling, milling and surface ground.
		PI 463B.2	Able to understand calibration and measurement process of pneumentic compurating.
		PI 463B.3	Able to learn various process such as lapping, wiredrawing and extrusion.
	PI 464B Computer Aided Manufacturing Laboratory – II (PI)	PI 464B.1	Able to run CNC programmes on actual machine
		PI 464B.2	Able to understand DNC system
		PI 464B.3	Able to familiarize students with computer aided die design
	PI 465D Project (PI)	PI 465B.1	Able to understand the basic concepts & broad principles of Industrial projects
		PI 465B.2	Able to conceptualize an industrial project
		PI 465B.3	Able to collect data and create details of the project
		PI 465B.4	Able to fabricate the project
	Practical Training		Able to understand actual industrial environments
			Able to prepare industrial training report
			Able to work on actual industrial projects
	Co-curricular Activities	PI 400E.1	Able to develop personality
		PI 400E.2	Able to promote hobbies of students
		PI 400E.3	Able to promote teamwork

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