SurTech

DR. SUDHIR CHANDRA SUR INSTITUTE OF TECHNOLOGY AND SPORTS COMPLEX
(Formerly known as Dr. Sudhir Chandra Sur Degree Engineering College)

SARADINDU PANDA

COs for Mechanical Engineering Department (3rd to 8th Semester)

SEMESTER – III

Course Name: Mathematics-III
Course Code: BS-M301

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
BS-M 301.1	Solve field problems in engineering involving PDEs.
BS-M 301.2	Implement the ideas of probability and random variables, calculate probabilities using conditional probability, rule of total probability and Bayes' theorem.
BS-M 301.3	Demonstrate various discrete and continuous probability distribution with their properties and their applications in physical and engineering environment.
BS-M 301.4	Use statistical tools for analyzing data samples and drawing inference on a given data set.

Course Name: Biology
Course Code: BS-BIO301

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
BS-BIO 301.CO 1	Describe biological observations of 18th Century that lead to major discoveries. Convey that classification per se is not what biology is all about but highlight the underlying criteria, such as morphological, biochemical and ecological
BS-BIO 301.CO 2	Highlight the concepts of recessiveness and dominance during the passage of genetic material from parent to offspring
BS-BIO 301.CO 3	Convey that all forms of life have the same building blocks and yet the manifestations are as diverse as one can imagine. Classify enzymes and distinguish between different mechanisms of enzyme action.
BS-BIO 301.CO 4	Identify DNA as a genetic material in the molecular basis of information transfer. Analyze biological processes at the reductionistic level. Apply thermodynamic principles to biological systems.
BS-BIO 301.CO 5	Identify and classify microorganisms.

Course Name: Basic Electronics Engineering
Course Code: ES-ECE 301

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
ES-ECE301.1	Understand the basic electronic devices (Diode, BJT, etc.) and applications.
ES-ECE301.2	Comprehend the operation of OpAmp and Oscillators.
ES-ECE301.3	Design basic digital electronic circuits.
ES-ECE301.4	Realize the functioning of electronic communication system.

Course Name: Thermodynamics
Course Code: PC ME301

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC ME301.CO 1	Students will understand different thermodynamic definitions and will be able to solve thermodynamic problems and apply energy balance to systems and control volumes involving heat and work interactions
PC ME301.CO 2	Students will Evaluate the changes in thermodynamic properties of substances and apply the steam table
PC ME301.CO 3	Understand the idea of flow process and also steady and unsteady process and evaluate the performance of energy conversion Devices.
PC ME301.CO 4	Understand and analyze the high grade and low-grade energy and also understand different thermodynamic cycles

Course Name: Engineering Mechanics
Course Code: ES-ME301

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
ES-ME301.1	Formulation and solve complex engineering problems by applying principles of engineering
ES-ME301.2	An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments
ES-ME301.3	Development and conduct appropriate experimentation
ES-ME301.4	An ability to acquire and apply new knowledge as needed

Course Name: Manufacturing Processes
Course Code: PC-ME302

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME302.1	Interpret the casting processes
PC-ME302.2	Recognize the principles of welding
PC-ME302.3	Correlate the forming processes like forging
PC-ME302.4	Interpret the casting processes

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Course Name: Practice of Manufacturing Processes
Course Code: PC-ME391

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME391.1	The different conventional and unconventional manufacturing methods employed for making different products.
PC-ME391.2	Understand integral parts of conventional lathe, shaping and milling machines and various accessories and attachments used.
PC-ME391.3	Working fitting models according to drawings using hand tools- V-block, marking gauge, files, hack saw, Drills etc.
PC-ME391.4	Perform machining operations like that plain shaping, inclined shaping, keyway cutting, Indexing and Gear cutting.

SEMESTER - IV

Course Name: Materials Engineering
Course Code: ES ME 401

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
ES ME401.1	Student will understand the classification of materials and idea of unit cell and understand the concept of crystallography.
ES ME401.2	An understanding of the basic concepts of phase transformation during solidification, phase diagrams, iron carbon equilibrium diagram, classifications of steel, iron, AL, Cu and it's alloys.
ES ME401.3	Student will apply the idea on heat treatment and how properties can be changed with heat treatment processes.
ES ME401.4	Student will Analyze and understand different static failure theories and understand the idea of Griffiths criterion and also understand the application of ferrous and non-ferrous metals and alloys.

Course Name: Applied Thermodynamics
Course Code: PC ME 401

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC ME 401.1	To learn about gas and vapour cycles and their first law and second law efficiencies
PC ME 401.2	To understand about the properties of dry and wet air and the principles of psychrometry
PC ME 401.3	To learn the about reciprocating compressors with and without intercooling
PC ME 401.4	To learn about I.C engines and the respective cycles like Otto cycle, Diesel Cycle and Dual Cycle

Course Name: Fluid Mechanics and Fluid Machines
Course Code: PC ME 402

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC ME 402.1	Understand the concept of fluid and its kinematic as well as dynamic properties.
PC ME 402.2	Evaluate flow through pipes, orifices, V-notches, weirs, open channels.
PC ME 402.3	Analyze and investigation on flow systems like Buckingham Pi theorem, Dimensionless numbers in fluid flow, submerged bodies, drag and lift, Boundary layer.
PC ME 402.4	Demonstrate the concept of hydraulic turbine, reciprocating pumps and centrifugal pumps.

Course Name: Strength Of Materials
Course Code: PC ME 403

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC ME 403. 1	Analyze various types of stresses & strains developed in a body against the application of external forces.
PC ME 403. 2	Determine shear force and bending moment for designing system components to meet desired characteristics from economic, environmental and social considerations.
PC ME 403. 3	Evaluate the beam stresses for a safe and sustainable design application and apply in constructive projects.
PC ME 403. 4	Understand the effect of torsion on beams and columns for a variety of loading conditions which boosts industrial skills.

Course Name: Metrology & Instrumentation
Course Code: PC-ME404

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME404.1	Understand the working of linear and angular measuring instruments.
PC-ME404.2	Know the fundamentals of limits and limit gauges, various methods for measurement of screw thread and surface roughness parameters and the working of optical measuring instruments.
PC-ME404.3	Acquire an overview of mechanical measurement systems and principle of instruments for motion and dimension measurement.
PC-ME404.4	Get basic idea about working principle and applications of devices for measurement of force and torque; strain and stress and temperature.

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Course Name: Practice of Manufacturing Processes and Systems Laboratory
Course Code: PC-ME491

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME491.1	Interpret the casting processes
PC-ME491.2	Recognize the principles of welding
PC-ME4914.3	Correlate the forming processes like forging

Course Name: Machine Drawing- I
Course Code: PC-ME492

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME492.1	Understand and apply the knowledge of machine drawing as a system of Communication in which ideas are expressed clearly and all information fully conveyed.
PC-ME492.2	Understand the design a system, component or process to meet desired needs within, realistic constraints such as manufacturability, economic, environmental, safety & sustainability etc., to represent a part drawing and assembly drawings.
PC-ME492.3	Identify, formulates, analyzes and solve Engineering Problems in Optimum time.

Course Name: Environmental Science
Course Code: MC 481

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
MC481.CO 1	Understand the natural environment and its relationships with human activities
MC481.CO 2	Apply the fundamental knowledge of science and engineering to assess environmental and health risk
MC481.CO 3	Develop guidelines and procedures for health and safety issues obeying the environmental laws and regulations
MC481.CO 4	Acquire skills for scientific problem-solving related to air, water, noise& land pollution

SEMESTER - V

Course Name: Heat Transfer
Course Code: PC ME 501

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC ME 501.1	Apply Fourier's law to validate the theoretical over all heat transfer coefficient.
PC ME 501.2	Apply Stefan-Boltzmann law of radiation and emissivity relation.
PC ME 501.3	Determine thermal properties of material by applying 1-D steady state heat transfer equation.
PC ME 501.4	Apply non-dimensional numbers to evaluate and validate heat transfer parameters.

Course Name: Solid Mechanics
Course Code: PC-ME502

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME502.1	able to understand the concept of stress-strain behaviour of materials and use Cartesian tensors to denote equations.
PC-ME502.2	able to understand and apply Constitutive equations for Generalized Hooke's law, Linear elasticity, Material symmetry, concepts of uniqueness and superposition.
PC-ME502.3	able to implement governing equations in cylindrical and spherical coordinates, axis symmetric problems, thick cylinders, rotating discs, torsion of non- circular cross-sections, stress concentration problems, thermo- elasticity, 2-D contact problems.
PC-ME502.4	able to formulate solutions using potentials, energy methods and understand the plasticity.

Course Name: Kinematics & Theory of Machine
Course Code: PC ME 503

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC ME 503.1	Understand the movements & degrees of freedom of kinematically driven machine components and the motion of linked mechanisms in terms of the displacement, velocity and acceleration at any point in a rigid link.
PC ME 503.2	Design cam, belt-drive and gear based mechanisms to generate specified output motion.
PC ME 503.3	Explore the motion of vibration based systems.
PC ME 503.4	Analyze the motion of balancing masses, governors, flywheels and gyroscopes.

Course Name: Effective Technical Communication
Course Code: HM-HU501

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**

HM HU501.CO 1	Learn principles of technical communication to apply in the professional front.
HM HU501.CO 2	Understand information development and designing through various technical documents.
HM HU501.CO 3	Acquire communication (written and oral) skill to Present technical information.
HM HU501.CO 4	Develop professionalism and personality through learning ethics etiquette and technical communication skill.

Course Name: Essence of Indian Traditional Knowledge
Course Code: MC501

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
MC501.CO 1	Learn concepts of Indian Traditional knowledge and modern scientific perspective.
MC501.CO 2	Understand the Indian perspective of modern scientific worldview.
MC501.CO 3	Learn basic principles of Yoga.
MC501.CO 4	Understand application of traditional knowledge in different sectors and intellectual property rights.

Course Name: Mechanical Engineering Laboratory (Thermal) I
Course Code: PC-ME591

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME591.1	Evaluate the problems involving steady state heat conduction in simple geometries.
PC-ME591.2	Develop experimental solutions for problems involving free and forced convection
PC-ME591.3	Differentiate radiation capabilities of black and grey surfaces by practical observation.
PC-ME591.4	Run variety of hydraulic turbine and carry out their performance study useful hydel power plants.

Course Name: Machine Drawing-II
Course Code: PC-ME592

COURSE OUTCOMES (COs)

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CODE	DESCRIPTION
PC-ME592.1	Understand and apply the knowledge of machine drawing as a system of Communication in which ideas are expressed clearly and all information fully conveyed.
PC-ME592.2	To understand the design a system, component or process to meet desired needs within realistic constraints such as manufacturability, economic, environmental, safety & sustainability etc. to represent a part drawing and assembly drawings.
PC-ME592.3	To identify, formulates, analyzes and solve Engineering Problems in Optimum time.

Course Name: Project Part: I
Course Code: PW ME 581

COURSE OUTCOMES (COs)	
CODE	DESCRIPTION
PW ME 581.1	To develop the ability to conduct investigations of complex engineering problems using research knowledge, methods and other modern engineering tools.
PW ME 581.2	To analyze a situation or mechanical system and identify possible ideas for practical implementation.
PW ME 581.3	To train the students in preparing project reports.
PW ME 581.4	To train the students to face review and viva voice examination.

SEMESTER - VI

Course Name: Manufacturing Technology
Course Code: PC ME 601

COURSE OUTCOMES (COs)	
CODE	DESCRIPTION
PC ME 601.1	Understand all machines and related tools for manufacturing various components.
PC ME 601.2	Understand the relationship between process and system in manufacturing domain.
PC ME 601.3	Analyze the experiment on CNC machine tools.
PC ME 601.4	Demonstration rapid prototyping methods.

Course Name: Design of Machine Elements
Course Code: PC ME 602

COURSE OUTCOMES (COs)	
CODE	DESCRIPTION

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PC ME 602.1	To understand the concept of theories of failures, material selection and fatigue in metals.
PC ME 602.2	To analyze and design different types of joints like riveted joints, welded joints, cotter joints and knuckle joints.
PC ME 602.3	To design and analyze of shafts, Shaft coupling (rigid, pin-bush and flexible type) and alignment of coupling.
PC ME 602.4	To apply the concept of machine design on transmission elements like clutches, brakes, gears and bearings.

Course Name: Turbo Machinery
Course Code: PE ME 601C

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PE ME 601C.1	Explain working principles and characteristics of different types of incompressible and compressible flow machines.
PE ME 601C.2	Understand performance parameters and efficiency calculations of different types of hydraulic turbines and pumps.
PE ME 601C.3	Analyze the isentropic and adiabatic equations for nozzles and diffusers.
PE ME 601C.4	Explore the performance and testing analysis of different turbo machinery entities with the help of different dimensionless numbers.

Course Name: Composite Material
Course Code: PE ME602F

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PE ME602F.1	**Identify, Describe** and **Evaluate** the properties of fibre reinforcements, polymer matrix materials and commercial composites.
PE ME602F.2	**Develop** competency in one or more common composite manufacturing techniques, and be able to select the appropriate technique for manufacture of fibre-reinforced composite products
PE ME601F.3	**Analyse** the elastic properties and simulate the mechanical performance of composite laminates; and **Understand** and predict the failure behaviour of fibre-reinforced composites
PE ME602F.4	**Apply** knowledge of composite mechanical performance and manufacturing methods to real life composites design problem

Course Name: Operation Research
Course Code: HM HU 601

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
HM HU 601.1	Apply forecasting methods for predicting demands.

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HM HU 601.2	Make decisions under certainty, uncertainty and conflicting situations.
HM HU 601.3	Apply linear programming tools for optimal utilization of resources in various types of industries.
HM HU 601.4	Solve transportation problems to minimize cost and understand the principles of assignment of jobs and recruitment polices.

Course Name: Constitution of India
Course Code: MC601

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
MC601.CO 1	Understand Basic Structure of the Constitution of India
MC601.CO 2	Apply the understanding in Engineering Profession
MC601.CO 3	Apply Constitutional Values in Engineering Education
MC601.CO 4	Apply Constitutional Provisions in Policy matters of the department
MC601.CO 5	Apply Team Spirit and Constitutional Legislative Provisions for Industrial Design
MC601.CO 6	Analyze Constitutional Values of Legislation, Executive & Judiciary in the light of the Professional requirements of Computer Science Engineering

Course Name: Mechanical Engineering Laboratory (Design)II
Course Code: PC ME 691

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC ME 691.1	Demonstrate the knowledge of basic machine elements to withstand loads and deformations for a given application, while considering additional specifications.
PC ME 691.2	Formulate and solve engineering problems based on design of spur gears with respect to tooth bending strength and surface strength specifications.
PC ME 691.3	Analyze the design of bearings using design charts and custom software and select appropriate bearings for an application using printed and electronic catalog data.
PC ME 691.4	Design shafts, brakes and clutches subjected to static or dynamic loads and present their designs orally.

Course Name: Project Part: IV
Course Code: PW ME 681

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PW ME 681.1	To develop the ability to conduct investigations of complex engineering problems using research knowledge, methods and other modern engineering tools.
PW ME 681.2	To analyze a situation or mechanical system and identify possible ideas for practical implementation.
PW ME	To train the students in preparing project reports.

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681.3	
PW ME 681.4	To train the students to face review and viva voice examination.

SEMESTER – VII

Course Name: Advanced Manufacturing Technology
Course Code: PC-ME701

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME701.1	To understand non- traditional machining processes and the effect of process parameters
PC-ME701.2	To differentiate the various non-traditional machining processes
PC-ME701.3	To demonstrate micromachining technology

Course Name: Automobile Engineering
Course Code: PE ME701A

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PE ME701.1	Understand and demonstrate the various systems in automobile and also its working principle
PE ME701.2	Explain the working of various parts like engine, transmission, clutch, brakes
PE ME701.3	Student shall apply design knowledge of different types of elements used in the automobile
PE ME701.4	Develop a strong base for understanding future developments in the automobile industry

Course Name: Advanced Welding Technology
Course Code: PE ME 702H

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PE ME 702H.1	Explore different types of welding materials and technology of welding.
PE ME 702H.2	Analyze different metals and their properties in welded constructions.
PE ME 702H.3	Understand the knowledge of quality techniques at production by welding.
PE ME 702H.4	Evaluate the different process parameters and cost for welding operations

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Course Name: Non-conventional Energy Sources
Course Code: OE-ME 701D

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
OE-ME 701D.1	Create awareness among students about renewable sources of energy
OE-ME 701D.2	Understand the working principle of hydro wind and wave based energy resources.
OE-ME 701D.3	Evaluate the efficiency of hydro, wind and wave power plants

Course Name: Economics for Engineers
Course Code: HM-HU701

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
HM-HU 701.1	Define economic decisions and estimate engineering costs from different cost estimation models.
HM-HU 701.2	Explain cash flow diagrams for different situations.
HM-HU 701.3	Apply the concepts of expected value, estimates and simulation uncertainty in economic analysis.
HM-HU 701.4	Analyze the concepts of depreciation, replacement analysis important in financial planning and management.

Course Name: Mechanical Engineering Laboratory III (Manufacturing)
Course Code: PC-ME791

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PC-ME791.1	Study cutting forces in machining processes
PC-ME791.2	Test the quality of weld and moulding sands
PC-ME791.3	Develop a practical understanding of advanced manufacturing processes.
PC-ME791.4	Understand the working of a robot and its programming
PC-ME791.5	Identify and rectify defects in parts and manufacturing processes related problems

Course Name: Project Part: III
Course Code: PW ME 781

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PW ME 781.1	To develop the ability to conduct investigations of complex engineering problems using research knowledge, methods and other modern engineering tools.
PW ME 781.2	To analyze a situation or mechanical system and identify possible ideas for practical implementation.
PW ME	To train the students in preparing project reports.

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781.3	
PW ME 781.4	To train the students to face review and viva voice examination.

SEMESTER – VIII

Course Name: Power Plant Engineering
Course Code: PE ME 801B

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PE ME 801B.1	Explore the working principles & applications of theoritical power plant cycles & power plant economics.
PE ME 801B.2	Describe detailed functionalities of boilers & boiler accessories.
PE ME 801B.3	Analyze all components of coal based power plant including firing,fuel and ash handling equipment.
PE ME 801B.4	Understand the detailed performance of steam turbines with the associate machineries & governing.

Course Name: 3D Printing and Design
Course Code: PE ME 802 F

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PE ME 802 F.1	Generate CAD model for 3D printing, import and export CAD data to generate .stl file
PE ME 802 F.2	Select a specific material for a given application
PE ME 802 F.3	Select a 3D printing process for an application
PE ME 802 F.4	Produce a product using 3D Printing or Additive manufacturing

Course Name: Total Quality Management
Course Code: OE ME 801 A

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
OE ME 801 A.1	Understand quality management philosophies, techniques, and frameworks
OE ME 801 A.2	Apply tools and techniques of TQM in manufacturing and service sectors.
OE ME 801 A.3	Understand the implications of quality management standards and systems

Course Name: Industrial Pollution and Control
Course Code: OE ME 802 D

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
OE ME 802 D.1	Understand the various types of pollution caused by the industries and their effects on the environment.
OE ME 802 D.2	Apply specifically about the causes, processes and control techniques of air pollution.
OE ME 802 D.3	Apply specifically about the causes, processes and control techniques of water pollution.
OE ME 802 D.4	Apply specifically about the causes, processes and control techniques of noise pollution.

Course Name: Project Part: IV
Course Code: PW ME 881

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PW ME 881.1	To develop the ability to conduct investigations of complex engineering problems using research knowledge, methods and other modern engineering tools.
PW ME 881.2	To analyze a situation or mechanical system and identify possible ideas for practical implementation.
PW ME 881.3	To train the students in preparing project reports.
PW ME 881.4	To train the students to face review and viva voice examination.

Course Name: Comprehensive Viva
Course Code: PW ME 882

COURSE OUTCOMES (COs)	
CODE	**DESCRIPTION**
PW ME 882.1	Carry an overall knowledge of major engineering subjects with their applications.
PW ME 882.2	Communicate effectively in an interview.
PW ME 882.3	Learn discipline, body language, positive attitude and ethics to follow whole life.