T.J.S. ENGINEERING COLLEGE
TJS Nagar, PERUVOYAL – 601 206

Department of Mechanical Engineering

Course Outcomes – ODD Semester 2020-21

Sl. No.	Semester	Theory/Practical	Course Code / Course Name
1.	3	Theory	MA8353-Transforms and Partial Differential Equations
2.	3	Theory	ME8391 -Engineering Thermodynamics
3.	3	Theory	CE8394 -Fluid Mechanics and Machinery
4.	3	Theory	ME8351-Manufacturing Technology - I
5.	3	Theory	EE8353-Electrical Drives and Controls
6.	3	Practical	ME8361-Manufacturing Technology Laboratory – I
7.	3	Practical	ME8381-Computer Aided Machine Drawing
8.	3	Practical	EE8361-Electrical Engineering Laboratory
9.	3	Practical	HS8381-Interpersonal Skills / Listening & Speaking
10.	5	Theory	ME8595 -Thermal Engineering- II
11.	5	Theory	ME8593-Design of Machine Elements
12.	5	Theory	ME8501 -Metrology and Measurements
13.	5	Theory	ME8594 -Dynamics of Machines
14.	5	Theory	OAN 0551 – Sensors and Transducers
15.	5	Practical	ME8511-Kinematics and Dynamics Laboratory
16.	5	Practical	ME8512 -Thermal Engineering Laboratory
17.	5	Practical	ME8513 -Metrology and Measurements Laboratory
18.	7	Theory	ME8792- Power Plant Engineering
19.	7	Theory	ME8791- Mechatronics
20.	7	Theory	ME8793 Process Planning and Cost Estimation
21.	7	Theory	ME8073 -Unconventional Machining Processes
22.	7	Theory	ME809-Non Destructive Testing and Evaluation
23	7	Theory	OML751-Testing of Materials
24.	7	Practical	ME8711- Simulation and Analysis Laboratory
25.	7	Practical	ME8781- Mechatronics Laboratory
26.	7	Practical	ME8712- Comprehension

MA8353-Transforms and Partial Differential Equations

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Understand how to solve the given standard partial differential equations.
CO2	Solve differential equations using Fourier series analysis which plays a vital role in engineering applications.
CO3	Appreciate the physical significance of Fourier series techniques in solving one and two dimensional heat flow problems and one dimensional wave equations.
CO4	Understand the mathematical principles on Fourier transforms would provide them the ability to formulate and solve some of the physical problems of engineering.
CO5	Construct z- transform and find inverse z-transform techniques for discrete time systems.
CO6	Use the effective mathematical tools for the solutions of difference equations by using Z transform techniques for discrete time systems.

ME8391 -Engineering Thermodynamics

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Explain the basic concepts and laws of thermodynamics.
CO2	Apply the concept of enthalpy and entropy in thermal systems
CO3	Compute the properties of pure substance and explain the working of steam cycles
CO4	Distinguish the properties of ideal and real gases.
CO5	Solve problems in psychrometric processes and gas mixtures.
CO6	Apply thermodynamic laws for real time applications

CE8394 -Fluid Mechanics and Machinery

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Apply mathematical knowledge to predict the properties and characteristics of a fluid.
CO2	Analyze and calculate major and minor losses associated with pipe flow in piping networks.
CO3	Mathematically predict the nature of physical quantities.
CO4	Critically analyze the performance of pumps.
CO5	Critically analyze the performance of turbines.

ME8351-Manufacturing Technology – I

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Distinguish the various casting methods for product making with their merits and demerits.
CO2	Distinguish the various material joining process and associated defects with possible cause and cure.
CO3	Discuss the various metal forming process with its application
CO4	Distinguish the various process involved in sheet metal forming with its applications and salient features
CO5	Explain the various process in making of plastic components for engineering / domestic applications.
CO6	Apply the suitable manufacturing process for making products.

EE8353-Electrical Drives and Controls

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Compare the types of Drives and its power rating
CO2	Explain the Mechanical & Braking characteristics of Motors
CO3	Compare the types of Motor Starters
CO4	Determine the Solid state Speed control of DC Drives
CO5	Determine the Solid state Speed control of AC Drives

Practical
ME8361-Manufacturing Technology Laboratory – I

COs	Course Outcome : The students, after the completion of the course, are expected to.
CO1	Demonstrate the safety precautions exercised in the mechanical workshop .
CO2	Make the work piece as per given shape and size using Lathe
CO3	Join two metals using arc welding.
CO4	Use sheet metal fabrication tools and make simple tray and funnel
CO5	Use different moulding tools, patterns and prepare sand moulds

ME8381-Computer Aided Machine Drawing

Cos	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Understand the various drawing standards, Fits and Tolerances
CO2	Re-create part drawings, sectional views and assembly drawings as per standards
CO3	Understand the design software tool
CO4	Design of machine components using Software tool
CO5	Detailing of machine components.

EE8361-Electrical Engineering Laboratory

Cos	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Understand the functions of electrical Machines
CO2	Demonstrate the basic working concepts of the various AC and DC motor
CO3	Compute performance of motor with various loads
CO4	Analysis the speed characteristic of different electrical machine

HS8381-Interpersonal Skills / Listening & Speaking

Cos	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Understand the Listening and responding appropriately
CO2	Participate in group discussions
CO3	Make effective presentations
CO4	Participate confidently and appropriately in conversations both formal and informal

Fifth Semester (Academic Year 2020-21)

ME8595 -Thermal Engineering- II

COs	Course Outcome : The students, after the completion of the course, are expected to…
CO 1	Discuss about various types of steam nozzles and its flow characteristics
CO 2	Explain the functioning and features of different types of Boilers along with its auxiliaries required to compute performance parameters.
CO 3	Calculate the Performance of steam turbines in power generation.
CO 4	Summarize the concept of Cogeneration, working features of heat pumps and Heat Exchangers.
CO5	Compute the cooling load for air conditioning and COP of refrigeration systems.
CO6	Apply thermal engineering principles to examine the performance of various thermal systems.

ME8593-Design of Machine Elements

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Compute the stress acting on various machine elements
CO2	Compute the dimensions, stress requirements of shaft and couplings based on various load conditions
CO3	Summarize about temporary and permanent joints based on application requirements
CO4	Compute the dimensions of the energy storing devices for specific applications
CO5	Predict appropriate bearing, from the standard catalog for varied applications
CO6	Apply the various design concepts on to real time product applications

ME8501 -Metrology and Measurements

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Describe the concepts of measurements to apply in various metrological instruments
CO2	Outline the principles of linear and angular measurement tools used for industrial applications
CO3	Demonstrate the techniques of form measurement used for industrial components
CO4	Explain the procedure for conducting computer aided inspection
CO5	Discuss various measuring techniques of mechanical properties in industrial applications

ME8594 -Dynamics of Machines

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Calculate static and dynamic forces of mechanisms
CO2	Calculate the balancing masses and their locations of reciprocating and rotating masses
CO3	Compute the frequency of free vibration.
CO4	Compute the frequency of forced vibration and damping coefficient.
CO5	Calculate the speed and lift of the governor and estimate the gyroscopic effect on automobiles, ships and airplanes.
CO6	Do the force analysis of Mechanisms and Machines to calculate the unbalanced forces and consequent vibrations to facilitate their design for smooth operations

OAN 0551 – Sensors and Transducers

Cos	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Expertise in various calibration techniques and signal types for sensors.
CO2	Apply the various sensors in the Automotive and Mechatronics applications
CO3	Study the basic principles of various smart sensors.
CO4	. Implement the DAQ systems with different sensors for real time applications

ME8511-Kinematics and Dynamics Laboratory

Cos	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Explain gear parameters, kinematics of mechanisms, gyroscopic effect and working of lab equipments.
CO2	Determine mass moment of inertia of mechanical element, governor effort and range sensitivity, natural frequency and damping coefficient, torsional frequency, critical speeds of shafts, balancing mass of rotating and reciprocating masses, and transmissibility ratio.

ME8512 -Thermal Engineering Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	conduct tests on heat conduction apparatus and evaluate thermal conductivity of materials
CO2	conduct tests on natural and forced convective heat transfer apparatus and evaluate heat transfer coefficient.
CO3	conduct tests on radiative heat transfer apparatus and evaluate Stefan Boltzmann constant and emissivity
CO4	conduct tests to evaluate the performance of parallel/counter flow heat exchanger apparatus and reciprocating air compressor.
CO5	conduct tests to evaluate the performance of refrigeration and airconditioning test rigs.

ME8513 -Metrology and Measurements Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Measure the gear tooth dimensions, angle using sine bar, straightness and flatness, thread parameters, temperature using thermocouple, force, displacement, torque and vibration.
CO2	Calibrate the vernier, micrometer and slip gauges and setting up the comparator for the inspection.

ME8792- Power Plant Engineering

Cos	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Explain the layout, construction and working of the components inside a thermal power plant.
CO2	Explain the layout, construction and working of the components inside a Diesel, Gas and Combined cycle power plants.
CO3	Explain the layout, construction and working of the components inside nuclear power plants.
CO4	Explain the layout, construction and working of the components inside Renewable energy power plants.
CO5	Explain the applications of power plants while extend their knowledge to power plant economics and environmental hazards and estimate the costs of electrical energy production.

ME8791 Mechatronics

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Discuss the interdisciplinary applications of Electronics, Electrical, Mechanical and Computer Systems for the Control of Mechanical, Electronic Systems and sensor technology.
CO2	Discuss the architecture of Microprocessor and Microcontroller, Pin Diagram, Addressing Modes of Microprocessor and Microcontroller.
CO3	Discuss Programmable Peripheral Interface, Architecture of 8255 PPI, and various device interfacing
CO4	Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.
CO5	Discuss various Actuators and Mechatronics system using the knowledge and skills acquired through the course and also from the given case studies

ME8793 Process Planning and Cost Estimation

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	select the process, equipment and tools for various industrial products.
CO2	prepare process planning activity chart.
CO3	explain the concept of cost estimation.
CO4	compute the job order cost for different type of shop floor.
CO5	calculate the machining time for various machining operations.

ME8073 -Unconventional Machining Processes

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Explain the need for unconventional machining processes and its classification
CO2	Compare various thermal energy and electrical energy based unconventional machining processes.
CO3	Summarize various chemical and electro-chemical energy based unconventional machining processes.
CO4	Explain various nano abrasives based unconventional machining processes.
CO5	Distinguish various recent trends based unconventional machining processes.

ME8097-Non Destructive Testing and Evaluation

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Explain the fundamental concepts of NDT
CO2	Discuss the different methods of NDE
CO3	Explain the concept of Thermography and Eddy current testing
CO4	Explain the concept of Ultrasonic Testing and Acoustic Emission
CO5	Explain the concept of Radiography

OML751-Testing of Materials

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Identify suitable testing technique to inspect industrial component
CO2	Ability to use the different technique and know its applications and limitations

ME8711- Simulation and Analysis Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	simulate the working principle of air conditioning system, hydraulic and pneumatic cylinder and cam follower mechanisms using MATLAB.
CO2	analyze the stresses and strains induced in plates, brackets and beams and heat transfer problems.
CO3	calculate the natural frequency and mode shape analysis of 2D components and beams

ME8781- Mechatronics Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Demonstrate the functioning of mechatronics system with various pneumatic, hydraulic and electrical systems.
CO2	Demonstrate the functioning of control systems with the help of PLC and microcontrollers

ME8712- Technical Seminar

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO 1	ability to understand and comprehend any given problem related to mechanical engineering field.

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Department of Mechanical Engineering

Course Outcomes – Even Semester 2020-21

Sl. No.	Semester	Theory/Practical	Course Code / Course Name
1)	4	Theory	MA8452- Statistics and Numerical Methods
2)	4	Theory	ME8492- Kinematics of Machinery
3)	4	Theory	ME8451- Manufacturing Technology – II
4)	4	Theory	ME8491- Engineering Metallurgy
5)	4	Theory	CE8395- Strength of Materials for Mechanical Engineers
6)	4	Theory	ME8493- Thermal Engineering- I
7)	4	Practical	ME8462- Manufacturing Technology Laboratory – II
8)	4	Practical	CE8381- Strength of Materials and Fluid Mechanics and Machinery Laboratory
9)	4	Practical	HS8461- Advanced Reading and Writing
10)	6	Theory	ME8651- Design of Transmission Systems
11)	6	Theory	ME8691 - Computer aided design and manufacturing
12)	6	Theory	ME8693 - Heat and Mass Transfer
13)	6	Theory	ME8692 - Finite Element Analysis
14)	6	Theory	ME8694 - Hydraulics and pneumatics
15)	6	Theory	ME8091 - Automobile Engineering
16)	6	Practical	ME8681 - C.A.D. / C.A.M. Laboratory
17)	6	Practical	ME8682 - Design and Fabrication Project
18)	6	Practical	HS8581 - Professional Communication
19)	8	Theory	MG8591- Principles of Management
20)	8	Theory	MG8091- Entrepreneurship Development
21)	8	Practical	ME8811- Project Work

MA8452 - Statistics and Numerical Methods

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Apply the concept of testing of hypothesis for small and large samples in real life problems.
CO2	Explain the concepts of algebraic and transcendental equations
CO3	Apply the basic concepts of classifications of design of experiments in the field of agriculture.
CO4	Appreciate the numerical techniques of interpolation in various intervals and apply the numerical techniques of differentiation and integration for engineering problems.
CO5	Understand the knowledge of various techniques and methods for solving first and second order ordinary differential equations.
CO6	Solve the partial and ordinary differential equations with initial and boundary conditions by using certain techniques with engineering applications.

ME8492 – Kinematics of Machinery

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Explain the principles of kinematic pairs of planar mechanisms.
CO2	Compute velocity and acceleration in planar mechanisms.
CO3	Apply various motion principles to draw cam profiles
CO4	Compute the gear terminology suitable for given application
CO5	Discuss the effect of various types of friction in power transmission

ME8451- Manufacturing Technology – II

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Apply the theory of metal cutting for effective machining.
CO2	Discuss the working principles of various operations performed in a lathe machine.
CO3	Explain the working of special type machines.
CO4	Discuss multi – point machining machineries.
CO5	Apply NC codes to prepare machining program.
CO6	Apply suitable machine tool in machining of desired product.
CO6	Apply thermal engineering principles to examine the performance of compressors, engines and turbines.

ME 8491 Engineering Metallurgy

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Explain various binary alloy systems with respective invariant reaction
CO2	Classify various heat treatment process and its significance
CO3	Discuss various Ferrous and non-ferrous metals with its application
CO4	Explain the various non-metallic materials with its applications
CO5	Compute the material properties by various material testing techniques
CO6	Apply the knowledge of material science on material selection for specific requirements

CE 8395 – Strength of Materials for Mechanical Engineers

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Define the basic concepts of stresses and strains.
CO2	Construct the S.F and B.M diagrams and explain stresses and deformations of beams
CO3	Evaluate the effect of bending moment and torsion in machine elements
CO4	Analyze the deformation behavior of simple structures subjected to different types of loads
CO5	Compute the change in dimensions of a Cylindrical shell subjected to internal fluid pressure
CO6	Evaluate and explain the effect of bending moments and torsion in machine elements

Laboratory

ME8462- Manufacturing Technology Laboratory – II

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Use different machine tools to manufacturing gears
CO2	Ability to use different machine tools to manufacturing gears
CO3	Ability to use different machine tools for finishing operations
CO4	Ability to manufacture tools using cutter grinder
CO5	Develop CNC part programming

CE8381- Strength of Materials and Fluid Mechanics and Machinery Laboratory

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Ability to perform Tension test on Solid materials.
CO2	Ability to perform Torsion test on Solid materials.
CO3	Ability to perform Hardness test on Solid materials.
CO4	Ability to perform Compression test on Solid materials.
CO5	Ability to perform Deformation test on Solid materials.

HS8461- Advanced Reading and Writing

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Write different types of essays.
CO2	Write winning job applications.
CO3	Read and evaluate texts critically.
CO4	Display critical thinking in various professional contexts.

Sixth Semester

ME8651- Design of Transmission Systems

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Apply the concepts of design to belts, chains and rope drives.
CO2	Apply the concepts of design to spur, helical gears.
CO3	Apply the concepts of design to worm and bevel gears.
CO4	Apply the concepts of design to gear boxes .
CO5	Apply the concepts of design to cams, brakes and clutches

ME8691- Computer Aided Design and Manufacturing

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Explain the 2D and 3D transformations, clipping algorithm, Manufacturing models and Metrics
CO2	Explain the fundamentals of parametric curves, surfaces and Solids
CO3	Summarize the different types of Standard systems used in CAD
CO4	Apply NC & CNC programming concepts to develop part programme for Lathe & Milling Machines
CO5	Summarize the different types of techniques used in Cellular Manufacturing and FMS

ME8693- Heat And Mass Transfer

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Apply heat conduction equations to different surface configurations under steady state and transient conditions and solve problems
CO2	Apply free and forced convective heat transfer correlations to internal and external flows through/over various surface configurations and solve problems
CO3	Explain the phenomena of boiling and condensation, apply LMTD and NTU methods of thermal analysis to different types of heat exchanger configurations and solve problems
CO4	Explain basic laws for Radiation and apply these principles to radiative heat transfer between different types of surfaces to solve problems
CO5	Apply diffusive and convective mass transfer equations and correlations to solve problems for different applications

ME8692 - Finite Element Analysis

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Summarize the basics of finite element formulation
CO2	Apply finite element formulations to solve one dimensional Problems
CO3	Apply finite element formulations to solve two dimensional scalar Problems
CO4	Apply finite element method to solve two dimensional Vector problems
CO5	Apply finite element method to solve problems on iso parametric element and dynamic Problems

ME 8694 - Hydraulics and Pneumatics

S.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Understand, compare and explain the concepts of discrete and continuum mathematical modeling.
CO2	Apply numerical methods for solving engineering problems for design.
CO3	Able to apply finite element formulation of Boundary value problems
CO4	Understand and explain application of FEA principles in heat transfer and fluid mechanics domains.
CO5	Understand, compare and explain the concepts of one dimensional and two dimensional cases of FEA.
CO6	Explain the dynamics analysis by FEA method.

ME8091 - Automobile Engineering

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Recognize the various parts of the automobile and their functions and materials.
CO2	Discuss the engine auxiliary systems and engine emission control.
CO3	Distinguish the working of different types of transmission systems.
CO4	Explain the Steering, Brakes and Suspension Systems.
CO5	Predict possible alternate sources of energy for IC Engines.

Laboratory

ME8681- CAD / CAM Laboratory

S.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO 1	Draw 3D and Assembly drawing using CAD software
CO 2	Demonstrate manual part programming with G and M codes using CAM

ME8682 - Design and Fabrication Project

S.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO 1	Design and Fabricate the machine element or the mechanical product.
CO 2	demonstrate the working model of the machine element or the mechanical product.

HS8581 - Professional Communication - Laboratory Based

S.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO 1	Make effective presentations
CO 2	Participate confidently in Group Discussions
CO3	Attend job interviews and be successful in them
CO4	Develop adequate Soft Skills required for the workplace

Eight Semester
MG8591-Principles of Management

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Upon completion of the course, students will be able to have clear understanding of managerial functions like planning, organizing, staffing, leading & controlling and have same basic knowledge on international aspect of management

MG 8091– Entrepreneurship Development

COs	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	Upon completion of the course, students will be able to gain knowledge and skills needed to run a business successfully.

Laboratory

ME8811- Project work

S.No.	Course Outcome : The students, after the completion of the course, are expected to ….
CO1	On Completion of the project work students will be in a position to take up any challenging practical problems and find solution by formulating proper methodology