

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

Department of Mechanical Engineering

Course Outcomes – ODD Semester 2019-20

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	OR 0551 - Renewable Energy Resources
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	ME6701- Power Plant Engineering
19.	7	Theory	ME6702- Mechatronics
20.	7	Theory	ME6703 Computer Integrated Manufacturing Systems
21.	7	Theory	GE6757 Total Quality Management
22.	7	Theory	ME6005 -Process Planning and Cost Estimation
23.	7	Theory	ME6012-Maintenance Engineering
24.	7	Practical	ME6711- Simulation and Analysis Laboratory
25.	7	Practical	ME6712- Mechatronics Laboratory
26.	7	Practical	ME6713- Comprehension

Third Semester (Academic Year 2019-20)

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 2019-20)

ME8595 -Thermal Engineering- II

COs	Course Outcome : The students, after the completion of the course, are expected to... 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

OR 0551 - Renewable Energy Resources

Cos	Course Outcome : The students, after the completion of the course, are expected to
CO1	Upon completion of this course, the students can able to identify the new methodologies / technologies for effective utilization of renewable energy sources.

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.

Seventh Semester (Academic year 2019-20)

ME6701 Power Plant Engineering

Cos	Course Outcome : The students, after the completion of the course, are expected to
CO1	Discuss the layout of thermal power plant and working principle of various types of boilers.
CO2	Explain the working of diesel and gas turbine power plant along with optimization technique
CO3	Discuss the various types of nuclear reactors used in nuclear power plant
CO4	Summarize the principles and working of various renewable energy power plants
CO5	Explain the energy, economic and environmental issues of power plants
CO6	Paraphrase the different types of power plant, its function and issues related to them

ME6702 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 and Electronic Systems.
CO2	Classify the actuation and sensor systems based on the principle of operation and application.
CO3	Discuss Mechatronic components and systems using the microprocessor & micro controller and their working
CO4	Explain the architecture, programming and application of programmable logic controllers to problems and challenges in the areas of Mechatronic engineering.
CO5	Discuss a Mechatronic system using the knowledge and skills acquired through the course and also from the given case studies

ME6703 Computer Integrated Manufacturing Systems

COs	Course Outcome : The students, after the completion of the course, are expected to
CO1	Explain the CIM concepts and basic elements of an automated system.
CO2	Explain the concept of Computer aided process planning and material requirement planning
CO3	Discuss the concept of cellular manufacturing using Rank order clustering and Hollier method
CO4	Explain FMS planning and applications of Automated guided vehicle systems.
CO5	Explain the concepts of robot control system and part programming
CO6	Explain the applications of computer in planning, manufacturing and controlling

GE6757 Total Quality Management

COs	Course Outcome : The students, after the completion of the course, are expected to
CO1	Discuss the philosophies of quality management
CO2	Apply the TQM principles for quality improvement in organization
CO3	Distinguish various TQM tools and techniques used in Manufacturing and Service sectors
CO4	Use QFD tool to design and develop a new product as per customer requirements
CO5	Explain various ISO Standards and Quality systems practiced in various sector
CO6	Summarize the basic concepts in total quality management relevant to manufacturing and service Sectors

ME6005 -Process Planning and Cost Estimation

COs	Course Outcome : The students, after the completion of the course, are expected to
CO1	Associate the knowledge of engineering fundamentals for process planning
CO2	Distinguish various process planning activities
CO3	Discuss the various elements involved in costing.
CO4	Estimate the product cost of job done by various manufacturing methods
CO5	Estimate the Machining time for various operations carried out in different machines
CO6	Apply the concept of Process planning and cost estimation for various production process

ME6012-Maintenance Engineering

COs	Course Outcome : The students, after the completion of the course, are expected to
CO1	Explain the principles and practices of maintenance planning for an organization
CO2	Discuss maintenance policies with special reference to preventive maintenance
CO3	Predict appropriate condition monitoring (CM) techniques and instruments
CO4	Distinguish various repair methods for basic machine elements
CO5	Summarize repair methods for material handling equipment.
CO6	Explain various maintenance categories like PM, CM and repairs of machine elements to control failures, accidents, down time etc

ME6711- Simulation and Analysis Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to
CO 1	Demonstrate the various applications of simulation and analysis tools.
CO 2	Discuss the need of software tools to analyze engineering problem
CO 3	Create the model, analyse and simulate experiments to meet real world systems
CO 4	Evaluate the performance of the various models using thermal, vibration and modal analysis

ME6712- Mechatronics Laboratory

COs	Course Outcome : The students, after the completion of the course, are expected to
CO 1	Understand the working of various pneumatic systems by practice
CO 2	Create various microprocessor or programs for stepper motors and allied equipments.
CO 3	Analyse the different hydraulic circuits through hydraulic trainer kit
CO 4	Demonstration of image processing technique kit
CO 5	Simulation of circuits with multiple cylinder sequences in electro pneumatic using PLC.
CO 6	Simulation of basic hydraulic, pneumatic and electrical circuits using software.

ME6713- Comprehension

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.

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

Department of Mechanical Engineering

Course Outcomes – Even Semester 2019-20

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	MG6863- Engineering Economics
20)	8	Theory	MG6071- Entrepreneurship Development
21)	8	Theory	ME6019- Non Destructive Testing
22)	8	Practical	ME6811- Project Work

Fourth Semester
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

MG6863- Engineering Economics

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to
CO1	Understand and explain the basics of economics and costing and compute costing of projects and processes for comparison.
CO2	Compile data, compute various costs for make or buy decisions and value engineering of components
CO3	Demonstrate the various cash flow methods for the comparison of alternatives
CO4	Evaluate, and select among alternatives proposals by understanding and explaining the concepts of replacement and maintenance analysis
CO5	Evaluate and solve problems related to public alternatives and economic life of an asset.
CO6	Explain the various depreciation techniques applicable in industry

MG 6071 – Entrepreneurship Development

COs	Course Outcome : The students, after the completion of the course, are expected to
CO1	Understand and explain the role of entrepreneur in economic growth of the nation
CO2	Outline the major motivation factors for becoming an entrepreneur
CO3	Classify, compare and analyze for setting up of a good business opportunity
CO4	Summarize the various sources of finance and method of accounting
CO5	Plan for establishing business opportunity with the knowledge on government norms
CO6	Apply the knowledge expanding business

ME6019- Non Destructive Testing

Sl.No.	Course Outcome : The students, after the completion of the course, are expected to
CO1	Upon completion of this course, the students can able to use the various Non Destructive Testing and Testing methods understand for defects and characterization of industrial components

Laboratory

ME6811- 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.