



# Sri Vasavi Engineering College (Autonomous)

(Sponsored by Sri Vasavi Educational Society)

(Approved by AICTE, New Delhi & Permanently affiliated to JNTUK, Kakinada)

(Accredited by NBA & NAAC with 'A' Grade, Recognized by UGC Under Section 2(f) & 12(B))

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## DEPARTMENT OF MECHANICAL ENGINEERING

### Course Outcomes (V20 Regulation)

#### B.Tech. III Semester

**Name of the Course: Metallurgy and Material Science**

**Course Code: V20MET03**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Explain the types of bonds in solids and crystallization of Metals.	K2
CO2	Construct phase diagrams for the study of alloys and phase Transformation reactions.	K2
CO3	Use different ferrous and nonferrous metals based on properties for various applications	K3
CO4	Apply suitable heat treatment process to achieve desired properties of metals and alloys.	K3
CO5	Illustrate the properties and applications of composites and Ceramic materials and understand the concepts of powder metallurgy.	K2

**Name of the Course: Mechanics of Solids**

**Course Code: V20MET04**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate concept of stress and strain of composite bars.	K3
CO2	Solve shear force and bending moment in beams.	K3
CO3	Calculate flexural and shear stresses in a beam and understand the torsional rigidity of shaft.	K3
CO4	Analyze the principal stresses in structural members.	K4
CO5	Solve the buckling load capacity of columns, and longitudinal stress and strains in thin cylinders.	K3

**Name of the Course: Fluid Mechanics with Machine Learning****Course Code: V20MET05**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Explain the concepts of fluid properties and measurement of pressure.	K2
CO2	Describe the types of flows, lines & apply equations of fluid mechanics and its applications.	K3
CO3	Calculate losses and force on different types of vanes.	K3
CO4	Calculate the performance of turbines and pumps.	K3
CO5	Understand the fundamentals of machine learning and machine learning for fluid mechanics.	K2

**Name of the Course: Thermodynamics****Course Code: V20MET06**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Discuss the basic terms related to work and heat.	K2
CO2	Explain first law of thermodynamics and internal energy.K2	K2
CO3	Apply the second law of thermodynamics to basic thermal systems.	K3
CO4	Analyze various thermodynamic cycles.	K4
CO5	Discuss about pure substance.	K2

**Name of the Course: Managerial Economics & Financial Analysis**

**Course Code: V20MBT51**

After successful completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Understand the basic concepts of managerial economics, demand, elasticity of demand and methods of demand forecasting.	K2
CO2	Interpret production concept, least cost combinations and various costs concepts in decision making.	K3
CO3	Differentiate various Markets and Pricing methods along with Business Cycles.	K2
CO4	Prepare financial statements and its analysis.	K3
CO5	Assess various investment project proposals with the help of Capital Budgeting techniques for decision making.	K3

**Name of the Course: Fluid Mechanics & Hydraulic Machines Lab**

**Course Code: V20MEL02**

After successful completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
C01	Determine the force exerted by jet, friction factor, loss of head due to sudden contraction.	K3
C02	Examine and Analyze the performance of pumps and turbines.	K3
C03	Calibrate different flow measuring devices.	K3

**Name of the Course: Machine Drawing**

**Course Code: V20MEL04**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Identify the national and international standards pertaining to machine drawing.	K2
CO2	Illustrate the importance of the linking functional and visualization aspects in the preparation of the part drawings	K3
CO3	Apply limits and tolerances to assemblies and choose appropriate fits for given assemblies.	K3
CO4	Interpret the Machining and surface finish symbols on the component drawings.	K3
CO5	Develop the part or assembly drawings as per the conventions.	K3

**Name of the Course: Professional Communication Skills - I**

**Course Code: V20ENT02**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Use vocabulary in regular chores of life with accuracy, make meaningful sentences, and describe people and their traits vividly.	K3
CO2	Distinguish between places of pilgrimage and holiday spots; describe incidents, things and process; and frame questions, statements and expressions.	K4
CO3	Demonstrate their knowledge of idioms which are similar to those of native speakers while speaking and writing and use phrases clearly and precisely to articulate their views that compare and contrast indianisms with native expressions and avoid common errors.	K3
CO4	Employ the vocabulary of netizens with ease and walk through the letters and emails for effective official correspondence and infer the accurate meaning of the homophones that are often confusing.	K3
CO5	Summarize their profile; introduce themselves as well as others by incorporating their accomplishments and Sketch stories and anecdotes in an interesting and engaging manner that arouses curiosity of the audience.	K5

## **B.Tech. IV Semester**

**Name of the Course: Probability and Statistics**

**Course Code: V20MAT04**

After successful completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Find the Expectation of Random variables	K3
CO2	Apply probability distribution to real time problems	K3
CO3	Plot a best fit curve to an experimental data and find the correlation and regression	K3
CO4	Find good estimators to various parameters	K3
CO5	Apply the principles of Statistical Inference to practical problems	K3

**Name of the Course: Kinematics of Machinery**

**Course Code: V20MET07**

After successful completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Explain the inversion of the four bar, slider crank and double slider chains.	K2
CO2	Analyze and perform the velocities and accelerations in mechanisms by graphical method.	K4
CO3	Explain the working of copying mechanism, straight line motion mechanisms, steering gears and Hooke's joint.	K2
CO4	Develop the cam profiles for given follower motions.	K3
CO5	Describe tooth profiles for gears, gear trains and compute the velocity ratio and torque in gear trains and calculate various parameters related to belts.	K3

**Name of the Course: Manufacturing Science with Artificial Intelligence**

**Course Code: V20MET08**

After successful completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Understand fundamentals of casting-patterns and its materials, Gating System	K2
CO2	Distinguish various welding processes and select a suitable process based on the application and requirements, explain advanced welding techniques, testing methods	K2
CO3	Explain the knowledge on Hot working and Cold Working Process	K3
CO4	Describe various bulk forming processes, sheet metal forming and processing of plastics.	K2
CO5	Apply the concepts of Artificial intelligence in manufacturing processes.	K3

**Name of the Course: Mechanical Measurements and Metrology**

**Course Code: V20MET09**

After successful completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Discuss the basic concepts of measurement system and Linear measuring Instruments.	K2
CO2	Explain various types of Temperature, Pressure and Flow measuring Instruments.	K2
CO3	Understand the working of Acceleration, Vibration and Strain measuring devices.	K2
CO4	Apply tolerances and fits for selected product quality and explain various Linear, Angular and Optical measuring instruments and their applications	K3
CO5	Explain the measurement of surface finish with various comparators	K2

**Name of the Course: Applied Thermodynamics****Course Code: V20MET10**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate the working of various IC engines and associated systems such as lubricating system, cooling system, fuel feed system and ignition system.	K2
CO2	Explain the working of boilers and its performance parameters.	K2
CO3	Compute the performance of steam nozzles and steam turbines.	K3
CO4	Analyze the working of steam condensers and their performance parameters.	K4
CO5	Compute the performance of gas turbines.	K3

**Name of the Course: Mechanical Measurements and Metrology Lab****Course Code: V20MEL05**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Experiment and examine errors in calibration of various instruments	K3
CO2	Explain the working principle of metrology and measuring equipments.	K2
CO3	Compute distance, angle and surface finish by using standard measuring equipments	K3

**Name of the Course: Manufacturing Process Lab****Course Code: V20MEL06**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Design and Make a pattern, test the properties of sand and prepare a casting.	K3
CO2	Perform Arc welding, Spot welding, TIG, MIG welding and Plasma Arc Cutting operations	K3
CO3	Perform blanking, piercing, Drawing and bending operations.	K3
CO4	Operate injection and blow moulding machines to manufacture plastic components	K3

**Name of the Course: Thermal Engineering Lab****Course Code: V20MEL07**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Evaluate the performance of I.C.Engines.	K4
CO2	Evaluate the performance of compressors.	K4
CO3	Describe the working of Boilers.	K2

**Name of the Course: Professional Communication Skills – II****Course Code: V20ENT03**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Demonstrate grammatical competence, analyze noun and pronoun dispositions, classify various kinds of verbs, adjectives and adverbs and identify errors in sentences; distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately.	K2
CO2	Organize individual words into one whole sentence using new vocabulary and focus on the error analysis of prepositions and conjunctions, build conversations which befit the situations and develop pre-reading strategies to improve comprehension skills. Distinguish and acquire knowledge of using words of the same category in a sentence and learn new words that promote communicative finesse. Find errors in sentences where the modifiers are misplaced and put them at the appropriate place, use hit pair words and send an email that is concise and lucid.	K3
CO3	Recognize the easiest and best possible way of solving problems in the area of Number and Letter Series, Analogy, Classification, Coding & Decoding Symbols, Ranking and Analytical Reasoning.	K4
CO4	Investigate the different types of logics involved in Mirror and Water Images, Logical Reasoning & Arithmetic Reasoning.	K4
CO5	Find the common traps in the questions and errors likely to be made from the concepts of Blood Relations, Directions, Average, Clock and Calendar, Data Sufficiency, Permutations-Combinations and Probability.	K3



## **B.Tech. V Semester**

**Name of the Course: Dynamics of machinery**

**Course Code: V20MET11**

After successful completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Apply gyroscopic effect for stabilization of sea vehicles, aircrafts and automobile Vehicles etc.,	K3
CO2	Apply friction for torque transmission of mechanical systems	K3
CO3	Interpret dynamic force analysis of slider crank mechanism in design of flywheel and different types of Governors for stability	K3
CO4	Understand balancing of reciprocating and rotary masses.	K2
CO5	Understand how to determine the natural frequencies of continuous systems starting from the general equation of displacement.	K2

**Name of the Course: Metal Cutting & Machine Tools**

**Course Code: V20MET12**

After successful completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Describe the mechanism of chip formation and forces involved while machining	K2
CO2	Describe various types of lathe, shaper, slotter, planar and drilling machines and their operations.	K2
CO3	Explain the construction and working of various milling and grinding machines.	K2
CO4	Discuss the basic principle and working of Ultrasonic machining, Abrasive jet machining and Electrochemical machining.	K2
CO5	Explain the basic principle and working of Electric discharge machining, electron beam machining, Laser beam machining.	K2

**Name of the Course: Design of Machine Members – I****Course Code: V20MET13**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Understand the stresses on design of machine elements.	K2
CO2	Apply the varying loads on machine elements	K3
CO3	Solve problems in bolted, welded and riveted joints	K3
CO4	Illustrate various types of Keys and cotter joints	K3
CO5	Apply the different type of loads on shafts and couplings	K3

**Name of the Course: Metal Cutting & Machine Tools Lab****Course Code: V20MEL08**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Understanding various mechanism used in different machine tools	K2
CO2	Apply desired work holders and tool holder for specific work	K3
CO3	Operate different machine tools	K3

**Name of the Course: Theory of Machines Lab****Course Code: V20MEL09**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Understand the concepts on various machine elements such as governors, springs, flywheel and cam & follower	K2
CO2	Examine the motion of gyroscope and static & dynamic balancing of masses	K3
CO3	Understand the principles of various power transmission systems such as shafts, gears and belt & pulley	K2

**Name of the Course: Professional Communication Skills - III****Course Code: V20ENT04**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Distinguish the subtle meanings of various words in different contexts, recognize similar words as well as words with contrast meanings and use them appropriately. Express writer's tone and relevant ideas using different types of writing skills and prepare resume to showcase skills and accomplishments. Organize thoughts in the discussions and express views without reticence. Develop the ability to write different types of essays in a structured way, maintaining cohesion and logic	K4
CO2	Identify the central theme and arrange the scrambled sentences into a meaningful passage. Draft emails with appropriate subject-lines and relevant content. Compare different pairs of words, recognize the relationship between the head words and the options to siphon correct analogy Choose an appropriate word to make a sentence meaningful. Infer the meaning of the picture by thinking out of the box and speak without inhibitions and face interviews with aplomb.	K2
CO3	Analyze appropriate methods of logical thinking on Ratio and Proportion, Partnership, LCM and HCF, Number System, Areas & Volumes.	K4
CO4	Demonstrate problem solving skills through the concepts of Percentages, Profit and loss, Simple Interest & Compound Interest and Allegation.	K3
CO5	Calculate the end results of Cubes, Dice and Data Analysis, Time & Work, Time & Distance, Race & Games.	K4

**Name of the Course: Internal Combustion Engines and Air Compressors****(Professional Elective – I)****Course Code: V20MEPE1**

After successful completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Understand the affects of various losses that occur in the actual engine operation and the working principles of I.C. Engines.	K2
CO2	Illustrate the function of fuel supply, ignition, lubrication and cooling systems of I.C. Engines.	K2
CO3	Interpret the combustion phenomena in S.I. and C.I. Engines and effect of various engine operating parameters on it.	K3
CO4	Calculate the performance parameters of I.C. Engines.	K3
CO5	Understand the classification and basic principles of compressors.	K2

**Name of the Course: Nanotechnology (Professional Elective – I)**

**Course Code: V20MEPE2**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Understand the essential concepts used in nanotechnology	K2
CO2	Identify the various nano materials properties	K2
CO3	Describe the syntheses and fabrication methods	K2
CO4	Explain the various characterization Techniques	K2
CO5	Use of the various applications of nanotechnology	K3

**Name of the Course: Composite Materials (Professional Elective – I)**

**Course Code: V20MEPE3**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Classify the composites, explain the required properties, reinforcements and uses of composites.	K2
CO2	Explain how common fibers are produced and how the properties of the fibers are related to the internal structure and the interfaces obtained.	K2
CO3	Illustrate the processing techniques for polymer matrix, ceramic matrix and metal matrix composites and list out their properties and applications	K3
CO4	Construct different ceramic composite materials	K3
CO5	Examine the processing of ceramic matrix composites and Calculate mechanical properties of composite materials	K3

## B.Tech. VI Semester

**Name of the Course: Heat Transfer with Artificial Intelligence**

**Course Code: V20MET14**

**After successful** completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Illustrate the basic modes of heat transfer, basic laws of heat transfer and to develop solution for one dimensional steady state heat conduction problems.	K3
CO2	Interpret the heat transfer through extended surfaces, to find solution for one dimensional extended surfaces and unsteady state heat conduction problems.	K3
CO3	Illustrate convective heat transfer and to apply Dimensional analysis concept to convective heat transfer and Apply empirical correlations for phase change process to calculate values for the convection heat transfer coefficient	K3
CO4	Illustrate Heat Exchangers and concepts of Artificial Intelligence.	K3
CO5	Employ the principles of radiation heat transfer, to find the shape factor and heat transfer rate through radiation.	K3

**Name of the Course: Operations Research**

**Course Code: V20MAT08**

**After successful** completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Understand the formulating of LPP and solve LPP by Simplex methods, artificial variables techniques.	K2
CO2	Solve Transportation and assignment problems.	K3
CO3	Explain the concept of Sequencing and replacement of item.	K2
CO4	Apply the principles of game theory to real world competitive situations	K3
CO5	Understand the concept of queues with single server,	K2

**Name of the Course: Design of Machine Elements – II**

**Course Code: V20MET15**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Apply the concepts of different types of Bearings for design	K3
CO2	Illustrate the design concept of IC Engine Parts	K3
CO3	Employ the design concepts to curved beams	K3
CO4	Examine different Transmissions Systems and mechanical springs	K2
CO5	Analyze the design of Spur & Helical Gears	K4

**Name of the Course: Heat Transfer Lab**

**Course Code: V20MEL10**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Evaluate the amount of heat exchange in various modes of heat transfer for several geometries.	K4
CO2	Evaluate the amount of heat exchange in condensation & boiling processes and for heat exchangers.	K4

**Name of the Course: Simulation of Mechanical Systems Lab**

**Course Code: V20MEL11**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Examine the stress analysis of trusses.	K3
CO2	Interpret the deflection analysis of different type of loads.	K3
CO3	Illustrate the stress analysis of different components.	K3
CO4	Develop the modal analysis of beams.	K3
CO5	Practice the basics of simulation using MATLAB	K3

**Name of the Course: Computer Numerical Control Programming Lab**

**Course Code: V20MEL12**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Describe the features of CNC Machine Tool.	K2
CO2	Examine the applications of various CNC machines like CNC lathe, CNC Vertical	K3
CO3	Interpret CNC Programmes for turning applications	K3
CO4	Prepare CNC programmes for milling applications	K3
CO5	Review modern control systems	K2

**Name of the Course: Intellectual Property Rights and Patents**

**Course Code: V20CEMC01**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Describe the need of Intellectual Property Rights	K2
CO2	Generalize different issues regarding Copy Rights	K2
CO3	Employ the procedure for Patent registration and granting	K3
CO4	Explain the importance of Trademark and its related issues	K2
CO5	Recognize in significance of Trade Secrets in Industry	K2

**Name of the Course: Tool and Die Design** (Professional Elective – II)

**Course Code: V20MEPE4**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Describe various tool materials and their applications.	K2
CO2	Construct cutting die with required specifications	K3
CO3	Construct non-cutting die with required specifications	K3
CO4	Explain various types of jigs and fixtures with design data	K2
CO5	Discuss various components and types of die casting dies	K2



**Name of the Course: Industrial Automation and Robotics** (Professional Elective – II)

**Course Code: V20MEPE5**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Describe various robot configuration and components.	K2
CO2	Select appropriate actuator sand sensors for a robot based on specific application.	K3
CO3	Apply kinematic and dynamic analysis for simple serial kinematic chains.	K3
CO4	Explain trajectory planning for a manipulator	K2
CO5	Understand the Robot Actuators And Feed Back Components	K2

**Name of the Course: Product Design and Development** (Professional Elective – II)

**Course Code: V20MEPE6**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Discuss proto typing of a product that meets established requirements.	K2
CO2	Describe product development, manufacturing and management.	K2
CO3	Investigate risk and identify corrective action.	K4
CO4	Experiment different tests and assess data.	K3
CO5	Illustrate maintenance concepts and product standardization.	K3

## B.Tech. VII Semester

**Name of the Course: Finite Element Methods** (Professional Elective – III)

**Course Code: V20MEPE7**

**After successful** completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Use the concepts of variational methods and weighted residual methods in FEM.	K3
CO2	Use Finite Element Formulation for solving the problems.	K3
CO3	Solve the problems of Truss elements and Beam elements by FEM.	K3
CO4	Use FEM to solve 2D CST problems.	K3
CO5	Apply finite element method for problems involving dynamics and heat transfer.	K3

**Name of the Course: Tribology** (Professional Elective – III)

**Course Code: V20MEPE8**

**After successful** completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Understand the fundamentals of tribology and associated parameters.	K2
CO2	Apply concepts of tribology for the performance analysis and design of components experiencing relative motion.	K3
CO3	Analyse the requirements and design hydrodynamic journal and plane slider bearings for a given application.	K4
CO4	Select proper bearing materials and lubricants for a given tribological application.	K3
CO5	Apply the principles of surface engineering for different applications of tribology.	K3

**Name of the Course: Micro Electro Mechanical Systems (MEMS)** (Professional Elective – III)

**Course Code: V20MEPE9**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Understand about the basics of MEMS, Methods of Micro machining.	K2
CO2	Interpret various Mechanical and Thermal sensors & Actuators	K3
CO3	Differentiate between different types of MOEMS devices	K2
CO4	Illustrate and explain various Magnetic sensors and Actuators & its applications	K3
CO5	Illustrate and explain various micro-fluidic devices & its applications	K3

**Name of the Course: Automobile Engineering** (Professional Elective – IV)

**Course Code: V20MEPE10**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Understand various components in four wheel automobile.	K2
CO2	Differentiate between different types of transmission systems used in automobile.	K4
CO3	Examine steering geometry and steering systems used in automobile and Interpret suspension systems in automobile	K3
CO4	Interpret breaking and electrical systems in automobile.	K3
CO5	Use various safety systems used in automobile and Practice engine service for different components in automobile.	K3

**Name of the Course: Cryogenics** (Professional Elective – IV)

**Course Code: V20MEPE11**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Illustrate the basics for evolution of low temperature science, Understand properties of materials at cryogenic temperatures.	K3
CO2	Illustrate various liquefaction systems.	K3
CO3	Illustrate gas liquefaction systems.	K3
CO4	Illustrate Cryogenic Refrigeration systems.	K3
CO5	Illustrate Cryogenic fluid storage and transfer system.	K3

**Name of the Course: Design for Manufacturing and Assembly** (Professional Elective – IV)

**Course Code: V20MEPE12**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Explain how a design can be made suitable for various manufacturing and assembly processes.	K2
CO2	Express various factors influencing the manufacturability of components.	K2
CO3	Illustrate various metal casting, extrusion and sheet metal work.	K2
CO4	Apply different factors to joining processes.	K3
CO5	Explain various assembly systems and assembly lines.	K2

**Name of the Course: Power Plant Engineering** (Professional Elective – V)

**Course Code: V20MEPE13**

**After successful** completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Explain the working and layout of steam power plant and the different systems comprising the plant.	K2
CO2	Describe the basic components and working principle of hydroelectric power plant.	K2
CO3	Explain the working principles, layouts of diesel power plant and gas turbine power plants.	K2
CO4	Describe the basic components and working principle of different reactors of nuclear power plant.	K2
CO5	Compute the power plant economics.	K3

**Name of the Course: Non Destructive Testing and Evaluation** (Professional Elective – V)

**Course Code: V20MEPE14**

**After successful** completion of the course, the student will be able to:

CO No.	Course Outcome	Knowledge Level
CO1	Identify the flaws in manufacturing process through radiographic inspection	K2
CO2	Explain the theory of wave propagation and inspect the components using ultrasonic test	K2
CO3	Identify various surface, subsurface flaws with LPT and ECT	K2
CO4	Explain the principle of magnetic particle test system, flaw detection and evolution	K2
CO5	Explain the industrial applications in railways, nuclear, aerospace	K2

**Name of the Course: Gas Dynamics and Jet Propulsion** (Professional Elective – V)

**Course Code: V20MEPE1**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Understand the basic principles of Gas Dynamics.	K2
CO2	Apply governing equations of Isentropic Flow.	K3
CO3	Illustrate governing equations of Fanno Flow, Rayleigh Flow.	K3
CO4	Develop governing equations of Normal Shock.	K3
CO5	Examine jet engines, rocket engines and associated parameters.	K3

**Name of the Course: CAD / CAM** (Job Oriented Course)

**Course Code: V20MEJO1**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Understand the basics of CAD/CAM and different representations of curves	K2
CO2	Identify the basic components to solve different surface models	K2
CO3	Interpret the functionality of numerical control systems to write the programming	K3
CO4	Illustrate part families and group technology models	K3
CO5	Apply appropriate process strategy to achieve FMS	K3

**Name of the Course: Refrigeration and Air conditioning (Job Oriented Course)**

**Course Code: V20MEJO2**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Apply the concept of refrigeration to various systems.	K3
CO2	Employ the methods to improve performance of vapor compression systems.	K3
CO3	Identify eco-friendly refrigerants and understanding various VCR System Components.	K2
CO4	Analyze cooling and heating loads in an air conditioning system.	K4
CO5	Explain various air conditioning systems.	K2

**Name of the Course: Integration of AI & ML in Mechanical Engineering (Job Oriented Course)**

**Course Code: V20MEJO3**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Apply ML models in design of mechanical materials	K3
CO2	Apply AI technologies for development of Robotics	K3
CO3	Apply AI to represent manufacturing problems	K3
CO4	Apply ML for engineering design	K3
CO5	Apply AI for thermal comfort systems	K3

**Name of the Course: Industrial Safety and Management** (Job Oriented Course)

**Course Code: V20MEJO4**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Understand the basic principles of Industrial Safety	K2
CO2	Discuss the principles of Directing for Safety	K2
CO3	Explain the principles of Safety Management	K2
CO4	Describe the role of Safety Committee	K2
CO5	Apply the knowledge for Accident Prevention	K3

**Name of the Course: Industrial Hydraulics and Pneumatics** (Job Oriented Course)

**Course Code: V20MEJO5**

**After successful** completion of the course, the student will be able to:

<b>CO No.</b>	<b>Course Outcome</b>	<b>Knowledge Level</b>
CO1	Identify the fundamentals of Fluid Power Systems found in industry today.	K2
CO2	Discuss various types of Fluid Power Actuators	K2
CO3	Illustrate various Hydraulic elements in the design of circuits	K3
CO4	Describe the operations of Accumulators & intensifiers typically used in industry.	K2
CO5	Illustrate various Pneumatic systems and their operations	K3



**Name of the Course: Automation in Manufacturing** (Job Oriented Course)

**Course Code: V20MEJO6**

**After successful** completion of the course, the student will be able to:

	After successful completion of the course, the student will be able to:	Knowledge Level
CO1	Explain Automation and types of Automations in the industries.	K2
CO2	Examine different Automated flow lines in the Industries.	K3
CO3	Asses and perform one or more processing and/or assembly operations on a starting raw material, part, or set of parts.	K3
CO4	Produce a sequence of automated or mechanized assembly operations Flexible manufacturing system (FMS)—a highly automated machine cell that produces part.	K3
CO5	Interpret logic controls, sensor, actuators and software configuration	K2



**HoD - ME**

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