*Viswambhara Educational Society*

# VAAGDEVI COLLEGE OF ENGINEERING

## UGC-Autonomous

## Department of Mechanical Engineering

**COURSE OUTCOMES FOR M.TECH – THERMAL ENGINEERING R20 FOR THE YEAR 2020-2021**

| Course Outcome | Semester I Sem | Subject Name (Subject Code) ADVANCED THERMODYNAMICS (M20TE01) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Emphasize the relevance of Evaluation of thermodynamic properties of working substance | | | |
| 2 | Know the applications of Energy properties of real gases, Vapour pressure, Clausius | | | |
| 3 | Apply Psychometric mixture properties and psychometric chart, Air conditioning processes, cooling towers | | | |
| 4 | Analyse Combustion Reactions, Enthalpy of formation. Entropy of formation, Reference levels of tables. Energy of formation, Heat reaction | | | |
| 5 | Select a problem in Review binary vapour cycle, co generation and combined cycles, Second law analysts of cycles and Refrigeration cycles | | | |
| Course Outcome | Semester I Sem | Subject Name (Subject Code) ADVANCED FLUID MECHANICS (M20TE02) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Relate Applications Of In Viscid Flow Of Incompressible Fluids | | | |
| 2 | Apply Basic Laws Of Fluid Flow | | | |
| 3 | Understanding The Viscous Flow | | | |
| 4 | Contrast Boundary Layer Concepts | | | |
| 5 | Tabulate Fundamental Concept Of Turbulence | | | |
| Course Outcome | Semester I Sem | Subject Name (Subject Code) ADVANCED REFRIGERATION AND AIR CONDITIONING (M20TE03) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Deal with Components of Vapor Compression System | | | |
| 2 | Develop the study skills on Production of Low Temperature. | | | |
| 3 | Develop the study skills on Steam Jet refrigeration system,Representation on T-s and h-s diagrams – limitations and applications. | | | |
| 4 | Enable students on Construction of Psychometric chart, Requirements of Comfort Air – conditioning ,Thermodynamics of human body | | | |
| 5 | Equip students with Parameters influencing the Effective Temperature. Summer, winter and year round air – conditioning systems | | | |
| Course Outcome | Semester I Sem | Subject Name (Subject Code) TURBO MACHINES (M20TE04) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
| **After the completion of this course, the students should be able to** | | | | |

| 1 | Understand the Fundamentals of turbo machines and their applications |
|---|---|
| 2 | Applicability of steam nozzle and steam turbine in power plant and the relation of their flow on performance of plant. |
| 3 | To equip students with the fundamental of thermodynamics concepts for gas dynamics. |
| 4 | Get Knowledge about type and working principle of centrifugal compressors. |
| 5 | Deal with Fundamental concept of Axial flow compressors and different type of cascade systems |

| Course Outcome | Semester I Sem | Subject Name (Subject Code) ENERGY MANAGEMENT (M20TE05) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| 1 | Understand The Need Of Energy Management And Its Principles. |
|---|---|
| 2 | Analyze The Requirement Of Energy Audit And Its Concepts. |
| 3 | Applythe Concepts Of Economic Analysis And Its Scope. |
| 4 | Select Methods Of Evaluation Of Projects. |
| 5 | Survey Fundamental Concept Energy Audit |

| Course Outcome | Semester I Sem | Subject Name (Subject Code) GAS TURBINES (M20TE06) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| 1 | Explain the Applications and classifications of gas turbines |
|---|---|
| 2 | Applicability of different processes for improving the performance of the plant. |
| 3 | Analysis of Ideal and Real cycle gas turbines and concept of improving the efficiency. |
| 4 | Get Knowledge about fundamental equations and laws of rotating machines |
| 5 | Learn the basic and advanced concepts and working principles of different type of compressors |

| Course Outcome | Semester I Sem | Subject Name (Subject Code) NON CONVENTIONAL ENERGY SOURCES (M20TE07) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| 1 | Know About Solar Energy Applications: Solar Water Heating. Space Heating, Active And Passive Heating Energy |
|---|---|
| 2 | Group Structure Of Earth, Geothermal Regions, Hot Springs. Hot Rocks |
| 3 | Illustrate A Problem In Thermionic & Thermoelectric Generation, MHD Generator. |
| 4 | Compare Fusion, Fusion Reaction, P-P Cycle, Carbon Cycle, Deuterium Cycle, Condition For Controlled Fusion, Fuel Cells And Photovoltaic. |
| 5 | Relate Energy Sources. Plant Productivity, Biomass Wastes, Aerobic And Anaerobic Bioconversion Processed |

| Course Outcome | Semester I Sem | Subject Name (Subject Code) EQUIPMENT DESIGN FOR THERMAL SYSTEMS (M20TE08) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| 1 | Get details about heat exchanger and its classifications. |
|---|---|
| 2 | Determine the effect of increasing pipes in performance of heat exchanger and get idea about double pipe heat exchanger. |

| | | | | |
|---|---|---|---|---|
| 3 | | Understand the working principle of steam condenser and explore the condensation of single vapors. | | |
| 4 | | Get Knowledge about processes like vaporization, evaporation and reboiling and study about the equipments used for these processes | | |
| 5 | | To understand the working principle of cooling tower | | |
| **Course Outcome** | **Semester I Sem** | **Subject Name (Subject Code)** ADVANCED THERMAL ENGINEERING LAB (M20TE09) | **No. of Hours L:0 T:0 P:4** | **Credits: 2** |

**After the completion of this course, the students should be able to**

| | |
|---|---|
| 1 | Understand the Analysis of air conditioning unit. |
| 2 | Understand the Analysis of heat pipe. |
| 3 | Know about Performance analysis of flat plate collector. |
| 4 | Know about Performance analysis of evacuative tube concentrator |

| **Course Outcome** | **Semester I Sem** | **Subject Name (Subject Code)** MODELING AND ANALYSIS LAB-I (M20TE10) | **No. of Hours L:0 T:0 P:4** | **Credits: 2** |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| | |
|---|---|
| 1 | Understand the Analysis of flow profile on the designed nozzle. |
| 2 | Understand the Designing the diffuser and Analysis of flow profile on the designed diffuser. |
| 3 | Understand the Analysis of fluid flow on over curved surface. |
| 4 | Understand the Analysis of force exerted by the fluid jet on fixed flat plate |

| **Course Outcome** | **Semester I Sem** | **Subject Name (Subject Code)** RESEARCH METHODOLOGY (M20MC01) | **No. of Hours L:2 T:0 P:0** | **Credits: 2** |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| | |
|---|---|
| 1 | Understand about Intellectual Property Right |
| 2 | Compose and write quality research reports and attain familiarity with intellectual property rights. |
| 3 | Estimate research problem formulation. |
| 4 | Analyze research related information. |
| 5 | Discuss new and better products for economic growth and social benefits. |

| **Course Outcome** | **Semester I Sem** | **Subject Name (Subject Code)** STRESS MANAGEMENT (M20AC02) | **No. of Hours L:2 T:0 P:0** | **Credits: 0** |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| | |
|---|---|
| 1 | Understand The Need Of Energy Management And Its Principles. |
| 2 | Analyze The Requirement Of Energy Audit And Its Concepts. |
| 3 | Apply The Concepts Of Economic Analysis And Its Scope. |
| 4 | Discuss The Methods Of Evaluation Of Projects. |
| 5 | Compare The Enhancing Creativity By Self Development Program Like Yoga. |

| **Course Outcome** | **Semester II Sem** | **Subject Name (Subject Code)** ADVANCED HEAT TRANSFER (M20TE11) | **No. of Hours L:3 T:0 P:0** | **Credits: 3** |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| | |
|---|---|
| 1 | Emphasize the General heat Conduction equation. |

| 2 | Know the Lumped system analysis |
|---|---|
| 3 | Know about Equations of fluid flow |
| 4 | To understand the concept of free convection, boiling and condensation |
| 5 | Get the knowledge about transfer of heat in the space and at higher temperat |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) ADVANCED I.C. ENGINES (M20TE12) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| 1 | Know about Design and operating Parameters |
|---|---|
| 2 | Applicability of Thermo-chemistry of Fuel-Air mixtures. |
| 3 | Understanding the effect of Volumetric Efficiency on the performance of the engines. |
| 4 | Get Knowledge on Mean velocity and turbulent characteristics. |
| 5 | Deal with Abnormal combustion Fuel factors, MPFI |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) CRYOGENIC ENGINEERING (M20TE13) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| 1 | To understand the main concept of cryogenic systems. |
|---|---|
| 2 | To know the importance and applications of gas liquefaction |
| 3 | Understand the working of liquefaction systems for various types of gases |
| 4 | Equip students with the knowledge of gas separation systems and purification systems. |
| 5 | To impart knowledge on cryogenic refrigeration systems |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) JET PROPULSION AND ROCKET ENGINEERING (M20TE14) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| 1 | To understand the concept of turbo jet propulsion system and performance of flight. |
|---|---|
| 2 | Enable students to learn the concept of rocketry and its fundamentals. |
| 3 | To impart knowledge on the effect of nozzle design on the performance of jet propulsion. |
| 4 | Get idea about the combustion chemistry of fuels used in rocketry. |
| 5 | Equip students with the knowledge of advanced rocket engines. |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) ALTERNATE FUELS (M20TE15) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

**After the completion of this course, the students should be able to**

| 1 | Know about Availability and properties of alternate fuels, general use of Alcohols, LPG, hydrogen, and ammonia. |
|---|---|
| 2 | Deal with Properties as engine fuel, alcohols and gasoline blends. |
| 3 | Deal with to solve a problem in performance in SI & CI Engines. |
| 4 | Deal with performance and emission characteristics, bio diesel and its characteristics |
| 5 | To enable students on Layout of an electric vehicle, advantage and Limitations, specifications, system components. |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) ADVANCED COMPUTATIONAL FLUID DYNAMICS (M20TE16) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

| After the completion of this course, the students should be able to | |
|---|---|
| 1 | Understand Finite Difference Method, Finite Volume Method, Finite Element Method |
| 2 | Consider Solution Methods Of Elliptical Equations |
| 3 | Understand Boundary Layer Equations For Laminar, Turbulent Flow |
| 4 | Solve Numerical On Burgers Equations: Explicit And Implicit Schemes, Runge- Kutta Method. |
| 5 | Apply Knowledge On Formulations Of Incompressible Viscous Flows By Finite Difference Methods. |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) THERMAL AND NUCLEAR POWER PLANTS (M20TE17) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

| After the completion of this course, the students should be able to | |
|---|---|
| 1 | Understand the Type of Power plants, Direct energy conversion system. |
| 2 | Analysis and Understand Recent developments in power generation. |
| 3 | Know about Feed water heaters. |
| 4 | To impart knowledge on Combined cycle power plant and its importance. |
| 5 | To understand the concepts of Nuclear Reactor and its Classification |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) THERMAL MEASUREMENTS & PROCESS CONTROLS (M20TE18) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|

| After the completion of this course, the students should be able to | |
|---|---|
| 1 | Understand the fundamental principles of measuring instruments. |
| 2 | Identify the working principle of all the instruments used to determine the flow. |
| 3 | Develop the advanced thermometers for different type of operations. |
| 4 | Measure the level by direct or indirect methods. |
| 5 | Impart knowledge on principles used for process control |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) ADVANCED INTERNAL COMBUSTION ENGINES LAB (M20TE19) | No. of Hours L:0 T:0 P:4 | Credits: 2 |
|---|---|---|---|---|

| After the completion of this course, the students should be able to | |
|---|---|
| 1 | Understand the effect of change in compression ratio on the performance of diesel& petrol engine. |
| 2 | Analyze the effect of change in fuel injection timing on the performance of diesel engine. |
| 3 | Understand and analysis Flame propagation analysis of gaseous fuels. |
| 4 | Use different type of fuels and analyze its effect on the performance of diesel and petrol |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) MODELING AND ANALYSIS LAB-II (M20TE20) | No. of Hours L:0 T:0 P:4 | Credits: 2 |
|---|---|---|---|---|

| After the completion of this course, the students should be able to | |
|---|---|
| 1 | Aware of Thermal stress analysis of piston head of diesel engine for real condition. |
| 2 | Design of intake and exhaust valve for diesel engine. |
| 3 | Analyze the thermal stress of crank rod of diesel engine for real operating conditions. |
| 4 | Understand effect of thermal stress on the intake and outlet valve of IC engines |

| Course Outcome | Semester II Sem | Subject Name (Subject Code) ENGLISH FOR RESEARCH PAPER WRITING (M20AC01) | No. of Hours L:0 T:0 P:4 | Credits: 2 |
|---|---|---|---|---|
| **After the completion of this course, the students should be able to** | | | | |
| 1 | To understand the nuances of language and vocabulary in writing a Research Paper. | | | |
| 2 | To develop the content, structure and format of writing a research paper. | | | |
| 3 | To give the practice of writinga Research Paper. | | | |
| 4 | To enable the students to evolve original research papers without subjected to plagiarism | | | |

| Course Outcome | Semester III Sem | Subject Name (Subject Code) ADVANCED MATERIALS FOR THERMAL SYSTEMS (M20TE22) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Understand the fundamentals of different type of testing methods. | | | |
| 2 | Analyse Impact Behavior Heat Treatment of Steels and Cast Irons. | | | |
| 3 | Impart knowledge on fundamentals of Nuclear Power Plant and Their Materials | | | |
| 4 | survey about materials in Fuel cells and Solar Cells Electro catalyst. | | | |
| 5 | Compare the Materials in Thermal Power Generation. | | | |

| Course Outcome | Semester III Sem | Subject Name (Subject Code) COMPUTER SIMULATION OF SI & CI ENGINES (M20TE23) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Impart knowledge on importance of computer simulation of IC engines. | | | |
| 2 | To understand the concept of Wiebe's function in SI engine modeling. | | | |
| 3 | Determine the importance of Watsons and White house and Way models in CI engines. | | | |
| 4 | Understand the basics of gas exchange processes. | | | |
| 5 | Equip students with knowledge of heat transfer to the surrounding from the IC engines | | | |

| Course Outcome | Semester III Sem | Subject Name (Subject Code) ADVANCED FINITE ELEMENT ANALYSIS (M20TE24) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Understand The Basic Concepts, Historical Back Ground, Applications Of FEM. | | | |
| 2 | Analysis And Understand Virtual Energy Principle | | | |
| 3 | Observe 1-D Structural Problems. | | | |
| 4 | Impart Knowledge On Hermite Shape Functions, Stiffness Matrix, And Load Vector. | | | |
| 5 | Apply Finite element modeling of Axi-symmetric solids | | | |

| Course Outcome | Semester III Sem | Subject Name (Subject Code) ADVANCED OPTIMIZATION TECHNIQUES & APPLICATIONS (M20MA01) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Know about the basics of one dimensional Optimization methods. | | | |
| 2 | Choose the ways to use Direct search method | | | |
| 3 | Calculate dynamic programming. | | | |
| 4 | Construct linear programming | | | |
| 5 | Analyze integer programming | | | |

| Course Outcome | Semester III Sem | Subject Name (Subject Code) BUSINESS LAW AND ETHICS (M20MB23) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
|---|---|---|---|---|
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Know the Business Laws related to incorporating a company | | | |
| 2 | Identify the Importance of Ethics in Business | | | |
| 3 | Categorize Cyber Crime and Legal Aspects. | | | |
| 4 | Analyze Business Ethics. | | | |
| 5 | Understand Negotiable Instruments Act – 1881 | | | |
| Course Outcome | Semester III Sem | Subject Name (Subject Code) PROJECT MANAGEMENT (M20MB30) | No. of Hours L:3 T:0 P:0 | Credits: 3 |
| **After the completion of this course, the students should be able to** | | | | |
| 1 | Importance of Project Management. | | | |
| 2 | Project Planning. Execution and implementation. | | | |
| 3 | Significance of teams in projects. | | | |
| 4 | Project evaluate techniques. | | | |
| 5 | Role of Scheduling and Network Analysis in Project Planning | | | |