Chaitanya Bharathi Institute of Technology (A)
Department of Mechanical Engineering

Department Vision

To be the destination for aspiring young minds to become globally competitive, enlightened, innovative, immediate contributors to the industry and successful in higher studies in the field of mechanical engineering.

Department Mission

1. To impart quality and innovative education in mechanical engineering with basic and specialized training, internships to meet the current and emerging needs of the industry.
2. To prepare the students for successful professional career by inculcating ethical, entrepreneurial and leadership qualities.
3. To foster Research and Development environment by disseminating knowledge and technology by involving the students in publications, sponsored projects and consultancy.

Program Educational Objectives of M.E (Thermal Engineering) Program

PE01	Prepare Graduates with Good Analytical, Computational and Experimental Skills to Design and Develop Energy Efficient Systems for Sustai
PE02	Prepare Graduates with High Level of Technical Competency combined with Research and Complex Problem Solving Ability to Generate Innovative Solutions in Thermal Engineering and allied areas.
PE03	Pursue Lifelong Learning for Career and Professional Growth with a Concern for Society and Environment.
PE04	Inculcate Teamwork, Communication and Interpersonal Skills adapting to Changing needs of society.

Program Outcomes of M.E (Thermal Engineering) Program

PO 1	An ability to independently carry out research /investigation and development work to solve practical problems
PO 2	An ability to write and present a substantial technical report/document
PO 3	Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor program
PO 4	Ethics: apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice
PO 5	Project management and finance: demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work as a member and leader in a team, to manage projects and in multidisciplinary environments
PO 6	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technology

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Chaitanya Bharathi Institute of Technology (A)
Department of Mechanical Engineering
Course Outcomes Statements for M.E. (TE) - R20 &R23

Admitted year: 2022 & 2023 **Year of graduation: 2024** **Sem: I to IV(R20) and I to II (R23)**

S.No.	Semester	AY	Course code	Name of the Course	Course Outcomes Statements
1	I	2023-24	20ME C201	Thermodynamics and Combustion	1. Apply various laws of thermodynamics to suit the engineering applications.
					2. Apply the knowledge of thermodynamics for the behavior of real gases.
					3. Understand the phenomenon of combustion
					4. Understand the application of power cycles to engineering practice.
					5. Understand various non-conventional energy conversion methods like fuel cells etc
2	I		20ME C202	Advanced Fluid Dynamics	1. Understand the concept of stream and velocity potential function
					2. Apply of the knowledge of equations for analysis in cfd
					3. Calculate thickness of boundary layer and shear stress
					4. Design nozzles and diffusers
					5. Estimate various parameters in fluids subjected to shocks
3	I		20ME E201	Thermal and Nuclear PowerPlants	1. Analyze on combustion of coal and find performance of different power plant cycles
					2. Analyze the combined cycle power plants and waste heat recovery systems
					3. Design various types of nuclear reactors taking safety precautions and making economically
					4. Calculate the energy rates of power distribution considering the factors affecting the economy
					5. Determine the pressure, temperature and flow measurements of steam and water to operate the
4	I		20ME E205	Design of Solar and Wind Systems	1.Understand the implementation status of NCES in India along with basic concepts of Solar Energy
					2.Understand PV Cell technology and storage methods
					4. Conceptually design the wind turbine and understand fuel cells functioning.
					5. Understand various Waste to Energy conversion technologies.
5	I		20ME C203	Thermal Systems Lab	1. Estimate the thermal efficiency of IC engine
					2. Prove that value of convection heat transfer coefficient is very high with two phase heat transfer
					3. Estimate the effectiveness of cross flow heat exchanger and prove that it is very high compared
					4. Find out properties of fluids such as coefficient of thermal expansion, enthalpy of fusion
					5. Determine COP of Refrigeration and air conditioned tutors
6	I		20ME C204	Design of Solar and Wind Systems Lab	1. Measure radiation using various instruments
					2. Find the performance of solar water pump, water heater

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					3. Determine the effect of tilting angle on pv cell
					4. Evaluate efficiency of wind turbine
					5. Differentiate KVIC and JANATAbio energy conversion systems
7	I		20EGA 101	English for Research Paper Writing -	1. Interpret the nuances of research paper writing.
					2. Differentiate the research paper format and citation of sources.
					3. To review the research papers and articles in a scientific manner.
					4. Avoid plagiarism and be able to develop their writing skills in presenting the research work.
					5. Create a research paper and acquire the knowledge of how and where to publish their original research
8	I		20MEM103	Research Methodology and IPR -	1. Define research problem, review and asses the quality of literature from various sources
					2. Improve the style and format of writing a report for technical paper/ Journal report, understand and
					3. Collect the data by various methods: observation, interview, questionnaires
					4. Analyze problem by statistical techniques: ANOVA, F-test, Chi-square
					5. Understand apply for patent and copyrights
9	II		20ME C106	Finite Element Techniques	1. potential energy formulations
					2. Analyze linear problems like axial, truss and beam, torsional analysis of circular shaft
					3. Analyze 2D structural problems using CST element and analyze the axi-symmetric problems with
					4. Evaluate the eigen values and eigen vectors for stepped bar, formulate 3 D elements, check for
					5. Solve linear 1 D and 2 D heat conduction and convection heat transfer problems. Use of FEA
10	II		20ME C205	Advanced Heat andMass Transfer	1. Apply the equations pertaining to unsteady state heat transfer and knowledge in extended surfaces
					2. Evaluate mass, momentum and energy equations with approximate and exact methods
					3. Apply heat transfer knowledge in calculation of boundary layer thickness and various dimensionless
					4. Evaluate heat transfer coefficients under phase change phenomena and radiation heat transfer
					5. Apply the knowledge of mass transfer in process industries
11	II		20ME E206	Computational Fluid Dynamics	1. Derive CFD governing equations and turbulence models.
					2. Apply different PDEs and know the importance of Taylor series of expansion.
					3. Solve simultaneous linear equations with various methods.
					4. Understand errors, stability, consistency and develop O,H and C grid generated models.
					5. Utilize FVM for heat transfer problems.
12	II		20ME E209	Turbo Machines	1. Apply gas dynamics equations depending upon applications

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					2. Estimate the power developed by steam turbines
					3. Calculate hydraulic efficiency of impulse and reaction turbines
					4. Find the efficiency, pressure rise, degree of reaction, slip factor and performance of axial flow and
					5. Understand cycles and improve the cycle efficiency in gas turbines
13	II		20ME C108	Computer Aided Engineering Lab	1. Understand the applications of one and two-dimensional elements
					2. Solve engineering problems
					3. Find buckling factors
					4. Understand industrial applications of forming and sheet metal operations
					5. Find fracture toughness
14	II		20ME C206	Computational Fluid Dynamics Lab	1. Analyze laminar flow problems in plates and pipes
					2. Solve steady and unsteady flow past a cylinder
					3. Perform analysis for free and forced convection
					4. Evaluate the effect of angle of attack and velocity on NACA aerofiol
					5. Simulate compressible flow in a nozzle, premixed combustion
15	II		20ME C207	Mini Project with Seminar	1. Formulate a specific problem and give solution
					2. Develop model/models either theoretical/practical/numerical form
					3. Solve, interpret/correlate the results and discussions
					4. Conclude the results obtained
					5. Write the documentation in standard format
16	II		20EC A101	Value Education	1. Gain necessary Knowledge for self-development
					2. Learn the importance of Human values and their application in day to day professional life.
					3. Appreciate the need and importance of interpersonal skills for successful career and social
					4. Emphasize the role of personal and social responsibility of an individual for all-round growth.
					5. Develop a perspective based on spiritual outlook and respect women, other religious practices, equality.
17	III		20ME E214	Engine Emissions and Pollution Control	1. Understand the importance of IC engine as prime mover and the combustion phenomenon in SI engine.
					2. Understand the phenomenon of combustion in CI engine along with turbocharging and supercharging
					3. Understand the formation of different pollutants in IC engines and their effect on environment and human
					4. Understand the measurement and control techniques of various pollutants from IC engines.
					5. Understand the significance of various alternative liquid and gaseous fuels in IC engines
18	III		20EE O101	Waste to Energy	1. Understand the concept of conservation of waste

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					2. Identify the different forms of wastage
					3. Chose the best way for conservation to produce energy from waste
					4. Explore the ways and means of combustion of biomass
					5. Develop a healthy environment for the mankind
19	III		20ME C208	Dissertation Phase-1	1. Students will be exposed to self-learning various topics.
					2. Students will learn to survey the literature such as books, national/ international refereed journals and
					3. Students will learn to write technical reports.
					4. Students will develop oral and written communication skills to present.
					5. Student will defend their work in front of technically qualified audience.
20	IV		20ME C209	Dissertation Phase-2	1. Students will be able to use different experimental techniques and will be able to use different software/
					2. Students will be able to design and develop an experimental set up/ equipment/test rig.
					3. Students will be able to conduct tests on existing set ups/equipments and draw logical conclusions from the
					4. Students will be able to either work in a research environment or in an industrial environment.
					5. Students will be conversant with technical report writing and will be able to present and convince their
1	I		23ME C201	Thermodynamics and Combustion	1. Apply various laws of thermodynamics to suit the engineering applications.
					2. Apply the knowledge of thermodynamics for the behavior of real gases.
					3. Understand the phenomenon of combustion
					4. Understand the application of power cycles to engineering practice.
					5. Understand various non-conventional energy conversion methods like fuel cells etc
2	I		23ME C202	Advanced Fluid Dynamics	1. Understand the concept of stream and velocity potential function
					2. Apply of the knowledge of equations for analysis in cfd
					3. Calculate thickness of boundary layer and shear stress
					4. Design nozzles and diffusers
					5. Estimate various parameters in fluids subjected to shocks
3	I		23ME E201	Thermal and Nuclear Power Plants	1. Analyze on combustion of coal and find performance of different power plant cycles
					2. Analyze the combined cycle power plants and waste heat recovery systems
					3. Design various types of nuclear reactors taking safety precautions and making economically
					4. Calculate the energy rates of power distribution considering the factors affecting the economy
					5. Determine the pressure, temperature and flow measurements of steam and water to operate the
4	I		23ME E206	Solar energy technologies	1. Explain the importance of renewable energy sources and sun-earth geometry

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					2. Analyze various applications of solar flat plate collectors
					3. Evaluate technical aspects of solar concentrating collectors that are useful to society and industry
					4. Asses the various applications of solar PV systems like off grid, stand alone etc.
					5. Communicate technological and socio-economic issues around solar
5	I		23ME C203	Thermal Systems Lab -1(Based On Core)	1. Estimate the thermal efficiency of IC engine
					2. Prove that value of convection heat transfer coefficient is very high with two phase heat transfer
					3. Estimate the effectiveness of cross flow heat exchanger and prove that it is very high compared
					4. Find out properties of fluids such as coefficient of thermal expansion, enthalpy of fusion
					5. Determine COP of Refrigeration and air conditioned tutors
6	II		23ME C204	Solar energy Technologies Lab (Based On core/Elective)	1. Find the performance of flat plate collector with different radiation levels
					2. Determine the performance of trough collector
					3. Analyze I-V and P-V characteristics of PV module
					4. Evaluate cut-in speed and efficiency of wind turbine
					5. Estimate the efficiency of solar-wind hybrid system
7	II		23ME C205	Advanced Heat and Mass Transfer	1. Apply the equations pertaining to unsteady state heat transfer and knowledge in extended surfaces
					2. Evaluate mass, momentum and energy equations with approximate and exact methods
					3. Apply heat transfer knowledge in calculation of boundary layer thickness and various dimensionless
					4. Evaluate heat transfer coefficients under phase change phenomena and radiation heat transfer
					5. Apply the knowledge of mass transfer in process industries
8	II		23ME C206	Computational Fluid Dynamics	1. Derive CFD governing equations and turbulence models.
					2. Apply different PDEs and know the importance of Taylor series of expansion.
					3. Solve simultaneous linear equations with various methods.
					4. Understand errors, stability, consistency and develop O.H and C grid generated models.
					5. Utilize FVM for heat transfer problems.
9	II		23ME C207	Engine Emissions and Pollution Control	1. Understand the importance of IC engine as prime mover and the combustion phenomenon in SI engine.
					2. Understand the phenomenon of combustion in CI engine along with turbocharging and supercharging
					3. Understand the formation of different pollutants in IC engines and their effect on environment and human
					4. Understand the measurement and control techniques of various pollutants from IC engines.
					Understand the significance of various alternative liquid and gaseous fuels in IC engines
10	II		23ME C208	Computational Fluid Dynamics Lab (Based On Core)	1. Analyze laminar flow problems in plates and pipes

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					2. Solve steady and unsteady flow past a cylinder
					3. Perform analysis for free and forced convection
					4. Evaluate the effect of angle of attack and velocity on NACA aerofiol
					5. Simulate compressible flow in a nozzle, premixed combustion
11	II		23ME C209	Thermal systems Lab-2 (Based On core/Elective)	1. Demonstrate the performance of axial flow fan and centrifugal blower.
					2. Study of COP of refrigeration/air conditioning tutor.
					3. Understand the behavior of flow properties over different models using subsonic wind tunnel.
					4. Demonstrate experimentally the pressure distribution over circular, symmetric and cambered
					5. Illustrate flow visualization studies at low speeds over different aerodynamic bodies.
12	II		23ME C210	Mini Project with Seminar	1. Formulate a specific problem and give solution
					2. Develop model/models either theoretical/practical/numerical form
					3. Solve, interpret/correlate the results and discussions
					4. Conclude the results obtained
					5. Write the documentation in standard format
13	I		23EN A101	English for research paper writing	1. Interpret the nuances of research paper writing.
					2. Differentiate the research paper format and citation of sources.
					3. To review the research papers and articles in a scientific manner.
					4. Avoid plagiarism and be able to develop their writing skills in presenting the research work.
					5. Create a research paper and acquire the knowledge of how and where to publish their original research

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