



RVS COLLEGE OF ENGINEERING AND TECHNOLOGY

COIMBATORE - 641 402



DEPARTMENT OF MECHANICAL ENGINEERING

ME-THERMAL ENGINEERING


REGULATION - 2021

Course Id	Semester	Course Code	Course Name	Course Outcome	Course Outcome
C101	I	MA4154	ADVANCED NUMERICAL METHODS	CO1	To study various numerical techniques to solve linear and non-linear algebraic and transcendental equations.
				CO2	To compare ordinary differential equations by finite difference and collocation methods.
				CO3	To establish finite difference methods to solve Parabolic and hyperbolic equations.
				CO4	To establish finite difference method to solve elliptic partial differential equations.
				CO5	To provide basic knowledge in finite elements method in solving partial differential equations.
C102	I	TE4151	ADVANCED HEAT TRANSFER	CO1	To impart knowledge on conduction heat transfer associated with radiation.
				CO2	To impart knowledge on the turbulent forced convective heat transfer.

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				CO3	To impart knowledge on the significance of Phase Change Heat Transfer and Mass Transfer
				CO4	To teach the heat exchanger design aspects including compact heat exchangers
				CO5	To impart knowledge on Mass transfer as an engineering phenomenon.
C103	I	TE4152	ADVANCED THERMODYNAMICS	CO1	Apply the law of thermodynamics to thermal systems.
				CO2	Analyse the actual thermodynamic cycles
				CO3	Design and analyse a multi component thermodynamic system
				CO4	Apply the thermodynamics concepts in automotive systems
				CO5	Understand and analyse the combustion of different fuels
C104	I	TE4101	ADVANCED FLUID MECHANICS	CO1	To understand the laws of fluid flow for ideal and viscous fluids.
				CO2	To represent the real solid shapes by suitable flow patterns and to analyze the same for aerodynamics performances
				CO3	To study about Laminar and turbulent flow in viscous flow theory
				CO4	To understand about boundary layer concept
				CO5	To understand the changes in properties in compressible flow and shock expansion.
C105	I	RM4151	RESEARCH METHODOLOGY AND IPR	CO1	To study about the Overview of research process and design
				CO2	To study about data collection and sources
				CO3	The overview of data analysis and written reports and oral presentation
				CO4	The concept of IPR, Evolution and development of concept of IPR, IPR development process
				CO5	To know the objectives and benefits of patent, Concept, features of patent, type and grant of IPR

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C106- PE	I	TE4001	AIRCRAFT AND JET PROPULSION	CO1	To know the basics of gas dynamics
				CO2	To study on Theory of Aircraft propulsion, Thrust, Various efficiencies of propulsion system
				CO3	To conduct the performance characteristics of aircraft engines (Ramjet, Turbojet, Scramjet and Turbofan engines)
				CO4	To understand the concept on theory of Ramjet, Turbojet, Scramjet and Turbofan engines and Performance characteristics
				CO5	To understand the Combustion in solid and liquid propellant, Reaction Control Systems and Rocket heat transfer
C107- PE	I	TE4073	HYDROGEN AND FUEL CELL TECHNOLOGIES	CO1	To study in detail on the hydrogen production methodologies, possible applications and various storage options.
				CO2	To understand the working principle of a typical fuel cell, its types and to elaborate on its thermodynamics and kinetics.
				CO3	To study the cost effectiveness and eco-friendliness of Fuel Cells.
				CO4	To Know the working of various fuel cells, their relative advantages / disadvantages and hydrogen generation/storage technologies.
				CO5	To know the various application of fuel cell and economics
C108- PE	I	TE4002	ENERGY RESOURCES	CO1	To explain concept of various forms of Non-renewable and renewable energy.
				CO2	To outline division aspects and utilization of renewable energy sources for both domestic and industrial applications.
				CO3	To study the environmental and cost economics of using renewable energy sources compared to fossil fuels.
				CO4	To Understand the commercial energy and renewable energy sources.
				CO5	To Know the working principle of various energy systems.
C109- PE	I	TE4003	ADVANCED INTERNAL COMBUSTION	CO1	To gain insight on the working principle of spark ignition engines and compression ignition engines
				CO2	To study the pollutant formation and its control in IC engines

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			ENGINES	CO3	To study the recent technologies adopted in IC engine applications
				CO4	To know the various alternates for fossil fuel for IC engines
				CO5	To understand the recent trends in IC engines.
C110-PE	I	TE4004	CRYOGENIC ENGINEERING	CO1	To give introductory knowledge of cryogenic Engineering.
				CO2	To impart knowledge in various liquefaction cycles
				CO3	To understand the concept of separation of cryogenics gases
				CO4	To study about the working of cry coolers and cryogenic refrigerators.
				CO5	To embark on a research career in Cryogenic Engineering
C111-PE	I	TE4005	REFRIGERATION SYSTEMS	CO1	To study the cycle analysis pertaining to Refrigeration systems.
				CO2	To study the performance of system components and their balancing in cycles.
				CO3	To study the significance of Refrigerants and their impact on the environment.
				CO4	To understand the concept of system balancing on Balance points and system simulation
				CO5	To know the concepts of Electric circuits in Refrigeration systems and control devices
C112-PE	I	IC4252	ELECTRONIC ENGINE MANAGEMENT SYSTEMS	CO1	To provide basic grounding on electronics
				CO2	To learn the various sensors used in engine management systems
				CO3	Give an overview of different types of ignition systems
				CO4	To understand the significance of gasoline injection systems
				CO5	To know the latest advancements in Diesel injection systems

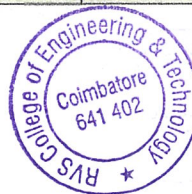
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C113- PE	I	TE4006	COGENERATION AND WASTE HEAT RECOVERY SYSTEMS	CO1	To analyze the basic energy generation cycles.
				CO2	To detail about the concept of cogeneration, its types.
				CO3	To detail about the probable areas of cogeneration applications.
				CO4	To study the significance of waste heat recovery systems.
				CO5	To carry out waste heat recovery systems economic analysis.
C114	I	TE4111	THERMAL ENGINEERING LABORATORY	CO1	To conduct experiments on various Thermal Engineering devices to study the performance and its application
				CO2	To Know the various alternate fuels are available for IC engines
				CO3	To Understand the thermodynamic relations for thermal engineering devices.
				CO4	To Understand the working principle of different renewable energy sources
				CO5	To Measure the properties of different fuels
SEMESTER II					
C115	II	TE4201	INSTRUMENTATION FOR THERMAL ENGINEERING	CO1	To classify various measuring instruments.
				CO2	To categorise temperature sensors and their applications in measurement
				CO3	To outline the advancements in pressure and volume measurements.
				CO4	To explore the various measurement techniques for thermos physical properties.
				CO5	To compare the different data acquisition systems.
C116	II	IC4291	COMPUTATIONAL FLUID DYNAMICS	CO1	This course aims to introduce numerical modeling and its role in the field of heat, fluid flow and combustion. It will enable the students to understand the various discretization methods and solving methodologies and to create confidence to solve complex problems in

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					the field of heat transfer and fluid dynamics.
				CO2	To develop finite volume discretised forms of the governing equations for diffusion processes.
				CO3	To develop finite volume discretised forms of the convection-diffusion processes.
				CO4	To develop pressure-based algorithms for flow processes.
				CO5	To introduce various turbulence models, Large Eddy Simulation and Direct Numerical Simulation.
C117	II	TE4202	FUELS, COMBUSTION AND EMISSION CONTROL	CO1	To understand the types of fuels.
				CO2	To compare the fuels in specific point.
				CO3	To understand the principles of combustion and combustion equipment's.
				CO4	To understand the thermodynamic process behind the combustion.
				CO5	To Identify the level of emission standards.
C118- PE	II	TE4007	DESIGN OF TURBO MACHINES	CO1	To elucidate the energy transfer process, Fans laws in Turbo machines.
				CO2	To illustrate the selection and working of Centrifugal Blowers.
				CO3	To classify different types of axial fans and rotor design.
				CO4	To outline the working different compressors and its performance characteristics.
				CO5	To select different fans / blowers / compressors for specific applications.
C119- PE	II	TE4008	ELECTRONICS COOLING AND PACKAGING	CO1	To provide a basic knowledge of the technologies and processes required for the packaging.
				CO2	To expose the students to all aspects of electronic equipment and components including electrical, thermal, fluid dynamics and reliability issues

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				CO3	To illustrate Radiation on the surface through electronic components
				CO4	To analyze the effect of electronics equipment at different modes
				CO5	To provide a vision for cooling systems and its packaging devices
C120- PE	II	TE4009	AIR CONDITIONING SYSTEMS	CO1	To learn the psychometric concepts underlying Air conditioning process
				CO2	To learn the design features and load estimation principles of specific Air conditioning system
				CO3	To learn about the critical auxiliary systems
				CO4	To learn about the air distribution circuits, water distribution circuits etc.
				CO5	To learn about the HVAC systems in air conditioning systems
C121- PE	II	IC4151	ALTERNATE FUELS FOR IC ENGINES	C01	To expose potential alternate fuels and their characteristics
				C02	To use appropriate synthetic fuels and fuel additives for better combustion characteristics
				C03	To utilise alcohol fuels effectively for lower emissions
				C04	To elaborate on the utilisation of Bio-Diesel and its types as a suitable fuel in CI engines
				C05	To utilise different gaseous fuels and predict their performance and combustion characteristics
C122- PE	II	TE4092	DESIGN OF HEAT EXCHANGERS	C01	To make students familiarize with the various types of heat exchangers
				C02	To explain the importance of thermal and stress analysis of heat exchangers
				C03	To inculcate the thermal design aspects of tubular heat exchangers

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				C04	To provide the details of design aspects of compact heat exchangers
				C05	To explain the function and design aspects of condensers and cooling towers
C123- PE	II	TE4010	BATTERY THERMAL MANAGEMENT SYSTEM	C01	The objective of this course is to introduce learner to batteries, its parameters, modeling and charging requirements.
				C02	The course will help learner to develop battery management algorithms for batteries
				C03	To analyze the battery state of charge and its functions
				C04	To evaluate models using the range of simulation.
				C05	To Examine the design standards of a battery.
C124- PE	II	EY4091	ADVANCED ENERGY STORAGE TECHNOLOGIES	C01	To understand the various types of energy storage technologies and its applications.
				C02	To study the various modeling techniques of energy storage systems using TRNSYS.
				C03	To learn working concepts and types of batteries.
				C04	To make the students to get understand the concepts of Hydrogen and Biogas storage.
				C05	To provide the insights on super capacitor, Fly wheel and compressed energy storage system.
C125- PE	II	IC4092	HYBRID AND ELECTRIC VEHICLES	C01	To introduce the concept of hybrid and electric drive trains.
				C02	To elaborate on the types and utilization of hybrid and electric drive trains
				C03	To expose on different types of AC and DC drives for electric vehicles.

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				C04	To understand and utilize different types of energy storage systems
				C05	To introduce concept of energy management strategies and drive sizing
C126-PE	II	TE4091	ADVANCED POWER PLANT ENGINEERING	C01	Understand the thermodynamics associated with power plants
				C02	Detail on the role of various utilities in coal based thermal power plants
				C03	Acquire know-how on the working of gas turbine and diesel power plants
				C04	Appreciate the concept of Poly generation for total energy recovery from a system
				C05	Brief on the working of hydroelectric and nuclear power plants
C127	II	TE4211	THERMAL SYSTEMS SIMULATION LABORATORY	C01	To learn the modeling and simulation analysis of various thermal engineering application using analysis software's.
				C02	To educate the students about calibration and its essentiality in thermal systems.
				C03	To educate the students about heat transfer analysis.
				C04	To Enhance the knowledge in various heat transfer simulation
				C05	Analyze the critical/influential properties of thermal systems
C128	II	TE4212	TECHNICAL SEMINAR - I	C01	To Identify and choose appropriate topic of relevance to Enhance the ability of self-study
				C02	To Improve presentation and communication skills
				C03	To Increase the breadth of knowledge.

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				C04	To Prepare technical report.
				C05	To Design, develop and deliver presentation on specified technical topic
SEMESTER III					
C201	III	TE4301	DESIGN AND OPTIMIZATION OF THERMAL ENERGY SYSTEMS	C01	To learn basic principles underlying pumping, heat exchangers; modeling and optimization in design of thermal systems.
				C02	To develop representational modes of real processes and systems.
				C03	To optimization concerning design of thermal systems.
				C04	To study about dynamic behavior, Steady state Simulation, Laplace Transformation and Stability Analysis
				C05	Case studies of optimization in thermal systems
C202-PE	III	IC4071	BOUNDARY LAYER THEORY AND TURBULENCE	CO1	To introduce the fundamental concepts of boundary layer in real flows.
				CO2	To distinguish between turbulent and laminar boundary layers.
				CO3	To model turbulent flows using various approaches.
				CO4	To analyse various flow parameters using statistical principles.
				CO5	To introduce the types, characteristics of wall shear flows from free shear flows.
C203-PE	III	TE4011	STEAM GENERATOR TECHNOLOGY	CO1	To educate the students on the types of boilers with their constructional and functional significance.
				CO2	To understand the working and design of fuel preparation units and boilers.
				CO3	To introduce the concept of boiler design, emission aspects.
				CO4	To Classify the auxiliary Equipment's in design.

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				CO5	To enumerate the technological design aspect in steam generator
C204- PE	III	EY4093	FLUIDIZED BED SYSTEMS	CO1	To understand the behavior of fluidized beds
				CO2	To learn about the heat transfer process
				CO3	To differentiate the combustion and gasification, and appreciate the relative merits
				CO4	To design components of fluidized bed systems
				CO5	To understand the industrial applications of fluidized bed systems
C205- PE	III	TE4012	ENERGY EFFICIENT BUILDINGS	CO1	To learn the green buildings concepts applicable to alternate design
				CO2	To be familiar with basic terminologies related to buildings
				CO3	To learn the building (air) conditioning techniques
				CO4	To know the methods to evaluate the performance of buildings
				CO5	To incorporate Renewable energy systems in buildings
C206- PE	III	IC4091	ENGINE POLLUTION AND CONTROL	CO1	To provide an insight about effect of engine out emissions on human health and environment
				CO2	To impart the knowledge on various pollutant species formations in SI and CI engine
				CO3	To divulge about various emission measurement techniques in engines and its significance
				CO4	To provide a discernment about various emission control methods
				CO5	To impart the knowledge about international and national driving cycles and emission standards.

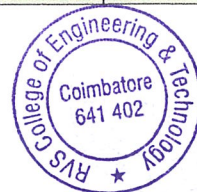
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C207- PE	III	TE4013	SOLAR THERMAL TECHNOLOGIES	C01	To clarify impression of various solar thermal energy collectors
				C02	To delineate the other applications and the devices used to collect solar energy
				C03	To study the various types and configurations of solar space conditioning system
				C04	To learn the various solar applications.
				C05	To summarize the basic economics of solar energy collection system.
C208	III	TE4311	TECHNICAL SEMINAR - II	C01	To enhance the reading ability required for identification of his/her field of interest.
				C02	Student will be able to use the knowledge of the fundamentals of subjects to search the related literature.
				C03	Student will be able to analyze and evaluate the available resources and to select/design/create most appropriate one.
				C04	Student will be able to apply the skill of presentation and communication techniques
				C05	To develop skills regarding professional communication and technical report writing.
C209	III	TE4312	PROJECT WORK – I	C01	To improve the skills in reading technical magazines, conference proceedings and journals.
				C02	To develop the skill of identifying research problems/projects in the field of Thermal Engineering.
				C03	To familiarize with the design and analysis tools required for the project work and plan the experimental platform, if any, required for project work.
				C04	To apply the skill of presentation and communication techniques
				C05	To develop skills regarding technical communication and technical report writing.

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SEMESTER IV					
C210	IV	TE4411	PROJECT WORK – II	C01	Able to integrate the knowledge of the fundamentals of subjects to search the related literature and devise solution.
				C02	To use knowledge for formulation / fabrication of the desired project.
				C03	To analyze the available resources and to select most appropriate one.
				C04	To improve the skills in publishing technical papers in conference proceedings and journals.
				C05	To produce factual results of their applied research idea in the thermal engineering, from phase – I

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