SREENIDHI EDUCATIONAL GROUP | SREENIDHI INSTITUTE OF SCIENCE AND TECHNOLOGY | SNIST Sreenidhi Institute of Science and Technology AUTONOMOUS

DEPARTMENT O F MECHANICAL ENGINEERING

M.Tech (THERMAL)

SUBJECTWISE CO STATEMENT – A19 BATCH

S. NO	Course code	Course Name	CO	CO Statement
1	7M101	THERMODYNAMICS AND COMBUSTION	1	Explain basic thermodynamic concepts and laws and calculate exergy change
			2	Describe the concepts enthalpy, entropy and Gibbs free energy change and their use in analyses of combustion reactions
			3	Analyze power plants, refrigeration plants andthermal/chemical installations
			4	Evaluate means of delaying equilibrium and obtaining desired combustion products
			5	Construct/design basic direct energy conversion systems and generate power
			6	Use advanced thermodynamics on a research case
2	7M102	ADVANCED FLUID DYNAMICS	1	Understand the basic driving forces and conservation equations driving fluid flow
			2	Gain in-depth knowledge of the effects of viscosity on flow
			3	Understand the effect of solid boundary resulting in drag in the flow domain
			4	Understand the effect of turbulence in external and internal flows
			5	Develop insights on the effect of varying density on

				flow fields
			6	Understand supersonic flows and shock waves
3	**7M102**	**ADVANCED FLUID DYNAMICS**	1	Understand the basic driving forces and conservation equations driving fluid flow
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4	**7M103**	**ENERGY CONSERVATION AND MANAGEMENT**	1	Acquire insight about the source and importance of energy, principles of energy management and its influence on environment
			2	Analyze all scenarios from energy consumption
			3	Generate scenarios of energy consumption and predict the future trend
			4	Suggest and plan energy conservation solutions
			5	Build systems related to sustainable energy
			6	Work on solar, wind and alternative energy systems in future
5	**7M104**	**REFRIGERATION AND AIR**	1	Gain insights into the components and performance of vapor compression systems.
			2	Learn the liquefaction of gases.

		CONDITIONING SYSTEM DESIGN	3	Solve problems in the design and optimization of air craft refrigeration systems.
			4	Understand the processes and properties of air conditioning systems.
			5	Learn about advanced refrigeration systems
			6	Construct and analyses refrigeration system on own
6	**7M105**	**GAS TURBINES**	1	Give examples of the main applications of turbo machines. Recognize typical designs of turbo machines
			2	Explain the working principles of turbomachines and apply it to various types of machines
			3	Determine the velocity triangles in turbomachinery stages operating at design and off-design conditions
			4	Apply the affinity laws to pumps such as to determine their off-design behavior Match a pump to a system and discuss various solutions of pump matching from a sustainability point-of-view
			5	Explain the working principle of various types of hydro turbines and know their application range Perform the preliminary design of turbomachines (pumps, compressors, turbines) on a 1- D basis Use design parameters for characterizing turbomachinery stages
			6	Determine the off-design behavior of turbines and compressors and relate it to changes in the velocity triangles
7	**7M106**	**NON-CONVENTIONAL ENERGY RESOURCES**	1	Identify the renewable energy sources and their utilization
			2	Understand the basic concepts of the solar radiation and analyze the solar Thermal systems for their

				utilization
			3	Understand the principle of working of solar cells and their modern manufacturing techniques
			4	Understand the concepts of the ocean thermal energy conversion systems and their applications
			5	Outline the methods of energy storage and identify the appropriate methods of energy storage for specific applications
			6	Understand the energy conversion from wind energy, geothermal energy, biomass, biogas, fuel cells and hydrogen
8	**7HC18**	**ENGLISH FOR RESEARCH PAPER WRITING**	1	Understand how to improve writing skills and level of readability
			2	Learn about what to write in each section
			3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission Syllabus
			4	Learn how to write Introduction and Literature review
			5	Write results and discussion section effectively
			6	Show command on manuscript writing
9	**7W105**	**RESEARCH METHODOLOGY & IPR**	1	Understand research problem formulation. Analyze research related information
			2	Follow research ethics
			3	Gain an understanding of how to write research proposals and reports
			4	Understand that today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity

			5	Understanding that when IPR would take such important place in growth of individuals & nation, it is needless to emphasis the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular
			6	Understand that IPR protection provides an incentive to inventors for further research work and investment in R & D, which leads to creation of new and better products, and in turn brings about, economic growth and social benefits
10	**7M171**	**ADVANCED THERMAL ENGINEERING LABORATORY**	1	COP estimation of vapour compression refrigeration test.
			2	Heat Balance sheet, Volumetric Efficiency and air fuel ratio estimation of an I.C. Engine.
			3	Performance analysis of Air conditioning unit.
			4	Solar Flat Plate Collector
			5	Performance analysis of heat pipe.
			6	Performance analysis of Air Compressor
11	**7M172**	**TECHINCAL SEMINAR-I**	1	Identify a research topic
			2	Collect literature
			3	Present seminar
			4	Understand how to identify research gap

			5	Write review paper without any plagiarism
			6	Learn to carry our research independently
12	**7M207**	**AHMT**	1	Apply the principles of heat transfer in the design of thermal systems
			2	Learn how to calculate heat conduction using shape factors
			3	Understand usage of empirical correlations for different convective heat transfer systems
			4	Gain knowledge about boiling and condensation heat transfer
			5	Apply the laws governing radiation heat transfer under real time situations
			6	Relate and understand the mass transfer phenomenon and the governing non- dimensional number
13	**7M208**	**STEAM ENGINEERING**	1	Explain working of different boilers and significance of mountings and accessories.
			2	Use techniques, skills, and modern engineering tools necessary for boiler performance assessment.
			3	Gain a theoretical and practical background in thermal systems, and will have a good understanding of energy conservation fundamentals. Students will have the ability to analyze thermal systems for energy conservation.
			4	Design a steam piping system, its components for a process and also design economical and effective insulation.
			5	Analyze a thermal system for sources of waste heat design and systems for waste heat recovery.
			6	Design and develop controls and instrumentation for effective monitoring of the process.

14	**7M209**	**COMPUTATIONAL FLUID DYNAMICS)**	1	Understand the basics driving the necessity of computational methods
			2	Develop an understanding of finite difference method and gain a practical application experience
			3	Develop an understanding of finite volume method and its application in solving simple PDEs
			4	Gain on-hand knowledge in applying FVM to solve flow and heat related problems
			5	Apply FVM to discretize and solve Navier-Stokes equations using SIMPLE algorithm
			6	Gain an understanding of improved schemes used in solving NS equations
15	**7M210**	**REFRIGERATION AND CRYOGENICS**	1	Understand properties of material at low temperature.
			2	Know about Pressure, temperature, flow, fluid quality and liquid level measurement at low temperature.
			3	Gain knowledge about different types of cryogenic insulations.
			4	Gain knowledge about different cryogenic applications.
			5	Learn about low temperature hazard
			6	Relate to applications in various fields
16	**7M211**	**DESIGN OF HEAT EXCHANGERS**	1	Understand the physics and the mathematical treatment of typical heat exchangers.
			2	Apply LMTD and Effectiveness methods in the design of heat exchangers and analyze the importance of LMTD approach over AMTD approach.
			3	Analyze the performance of double-pipe counter flow (hair-pin) heat exchangers.

			4	Design and analyze the shell and tube heat exchanger.
			5	Understand the fundamental, physical and mathematical aspects of boiling and condensation.
			6	Classify cooling towers and explain their technical features.
17	**7M212**	**THERMAL AND NUCLEAR POWER PLANTS**	1	Describe how fission is accomplished and the basics of how a nuclear reactor produce energy
			2	Discuss the thermal cycle and describe heat transfer and fluid flow
			3	Identify the major components of a nuclear power plant including generators, turbines, and cooling systems
				Examine nuclear power plant safety systems and the concepts of redundancy and defense in-depth
				Describe the requirements associated with a refuel outage and nuclear fuel reload
			4	Know various methods for the Economies of Power Generation and power plant instrumentation
18	**7M213**	**ADVANCED MATHEMATICAL METHODS IN ENGINEERING**	1	Apply appropriate optimization techniques and solve based on the type of optimization problem like single variable or multivariable.
			2	Make sensitivity analysis to study effect of changes in parameters of LPP on the optimal solution without reworking.
			3	Simulate the system to estimate specified performance measures.
			4	Solve integer programming problem by either geometry cutting plane algorithm or branch band method.

			5	Apply chance constrained algorithm and solve stochastic linear programme.
			6	Formulate GP model and solve it. Solve given optimization problem by genetic algorithm or simulated annealing or PSO.
19	**7M214**	**ADVANCED FINITE ELEMENT ANALYSIS**	1	Establish the mathematical models for the complex analysis problems and predict the nature of solution.
			2	Formulate element characteristic matrices and vectors.
			3	Identify the boundary conditions and their incorporation in to the FE equations.
			4	Solve the problems with simple geometries, with hand calculations involving the fundamental concepts.
			5	Interpret the analysis results for the improvement or modification of the system.
			6	Apply FEM to industrial problems with dynamic considerations
20	**7M273**	**TECHINCAL SEMINAR-II**	1	Identify a research topic
			2	Collect literature
			3	Present seminar
			4	Discuss the queries
			5	Write review paper without any plagiarism
			6	Learn to carry our research independently
21	**7M274**	**CFD Laboratory**	1	Steady State and Transient Heat Conduction
			2	Laminar Flow over a Cylinder

			3	Internal Flow with Turbulence and Heat Transfer
			4	Species Transport - Chemical Reaction
			5	Two-phase Flow - Filling of a Tank
			6	Flow through Porous Media
22	**7M315**	**DESIGN OF SOLAR AND WIND SYSTEMS**	1	Identify the renewable energy sources and their utilization.
			2	Understand the basic concepts of the solar radiation and analyze the solar Thermal systems for their utilization.
			3	Understand the principle of working of solar cells and their modern manufacturing techniques.
			4	Understand the energy conversion from wind energy.
			5	Outline the methods of energy storage and identify the appropriate methods of energy storage for specific applications
			6	Able to design solar and wind energy systems for real world applications.
23	**7ZC32**	**COST MANAGEMENT OF ENGINEERING PROJECTS**		Gain an insight into the costing system and its management.
				Analyze costing and profits involved in engineering projects.
				Understand various types of budgetary planning
				Learn project management and evaluation techniques.
				Apply quantitative methods and simulation for project cost management.

				Give solutions to effectively budget and plan projects using tools and techniques
24	**7ZC31**	**BUSINESS ANALYTICS**	1	Demonstrate knowledge of data analytics.
			2	Think critically in making decisions based on data and deep analytics.
			3	Use technical skills in predicative and prescriptive modeling to support business decision-making.
			4	Translate data into clear, actionable insights
			5	Mange business process using analytical and management tools.
			6	Analyze and solve problems from different industries such as manufacturing, service, retail, software, banking and finance, sports, pharmaceutical, aerospace etc
25	**7WC17**	**INDUSTRIAL SAFETY**	1	Acquire knowledge on different safety measured to be taken in industry
			2	Acquire knowledge on different maintenance and systems and service life cycle calculations
			3	Demonstrate the wear behavior of different mechanical elements and and its preventive measures
			4	Acquire knowledge on different types of faults in machine tools and their general causes.
			5	Acquire knowledge on Periodic and preventive maintenance
			6	Acquire knowledge on procedures and Steps for periodic and preventive maintenance
26	**7WC18**	**OPERATIONS RESEARCH**	1	Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.

			2	Recognize and solve the problem of transportation involving a large number of shipping routes with least transportation cost and generate optimal assignment strategy for different situations
			3	Use Johnson's rule to create the optimal sequencing schedule for a sequencing problem and make decisions about replacing an item using replacement policy
			4	Analyze the performance measures of Queing system and calculate the EOQ for minimizing the total inventory cost
			5	Apply simulation techniques for solving various types of problems and apply dynamic programming approach for obtaining optimal solutions
			6	Formulate and solve mathematical model (linear programming problem) for a physical situations like production, distribution of goods and economics.
27	**7WC19**	**COMPOSITES**	1	Student acquires knowledge on different types of composite materials and its applications
			2	Student acquires knowledge on Mechanical Behavior of composites of different composite materials
			3	Students should demonstrate the Manufacturing of Metal Matrix Composites and its properties
			4	Student acquires knowledge on Manufacturing of Ceramic Matrix Composites and its properties
			5	Student acquires knowledge on Manufacturing of Polymer Matrix Composites
			6	Student acquires knowledge on Failure Criteria-strength ratio, maximum stress Criteria
28	**7HC21**	**COST MANAGEMETNTS OF ENGINEERING PROJECTS**	1	Student acquires knowledge on different costing system and Cost concepts in decision-making
			2	Student acquires knowledge on Break-even Analysis, Cost-Volume-Profit Analysis and various decision-making problems
			3	Students should demonstrate the Manufacturing of Metal Matrix Composites and its properties

			4	Student acquires knowledge on different project management analysis
			5	Student acquires knowledge on Project evaluation systems
			6	Student acquires knowledge on different quantitative techniques
29	**7MC17**	**WASTE TO ENERGY**	1	Student acquires knowledge on utilization of energy in different types of energy
			2	Student acquires knowledge on Biomass Pyrolysis and Manufacture of pyrolytic oils and gases
			3	Students should demonstrate the Biomass Gasification process
			4	Student acquires knowledge on Biomass Combustion process
			5	Student acquires knowledge on Properties of biogas
			6	Student acquires knowledge on Urban waste to energy conversion – Biomass energy programme in India.
30	**7M479**	**DISSERTATION AND DEFENCE VIVA**	1	Students use the concepts learned in the courses, so far, in conceptualizing, designing and executing the projects
			2	Enables to apply modern tools and technologies for project works
			3	Inculcates an enthusiasm to use the creative ideas to execute projects to meet the current needs of the society
			4	Enhances communicative skills and team work
			5	The students learn the ability to work as an individual with multidisciplinary approach
			6	Students use the concepts learned in the courses, so far, in conceptualizing, designing and executing the projects