



ADITYA ENGINEERING COLLEGE

An Autonomous Institution

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Department of Mechanical Engineering

M.Tech. (Thermal Engineering) - AR19 - Course Articulation Matrix

Note: Correlation Levels are 1 or 2 or 3. Where 1- Slight(Low), 2 - Moderate(Medium), 3 - Substantial (High).

CO Statements		POs											PSOs		
I SEM															
Course Code	192TE1T01- ADVANCED FLUID MECHANICS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain Inviscid Flow of Incompressible Fluids and Basic Laws of fluid Flow.	2	-	-	-	-	-	3	-	-	-	-	-	1	-
CO2	Demonstrate the Viscous Flow and Navier Stokes Equations.	2	2	-	-	-	-	3	-	-	-	-	-	1	-
CO3	Analyze the concepts of Boundary Layer Theory.	3	-	-	3	-	-	-	-	-	-	-	-	2	-
CO4	Apply the boundary layer concept in Turbulent Flow.	3	-	-	2	-	-	-	-	-	-	-	-	2	-
CO5	Explain the different types of Compressible Fluid Flow.	3	-	-	1	-	-	-	-	-	-	-	-	-	-
Course Code	192TE1T02-COMPUTATIONAL FLUID DYNAMICS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Have good knowledge and understanding of computational aspects of fluid dynamics,	2	-	-	-	2	-	3	-	-	-	-	-	1	-
CO2	Describe need of modelling and simulation and its overall methodology of execution.	2	-	-	-	2	-	3	-	-	-	-	-	2	-
CO3	Apply their knowledge to solve a system of linear algebraic equation using standard direct and iterative technique.	3	-	-	-	3	-	-	-	-	-	-	-	1	-
CO4	Examine, analyze and formulate a thermal and fluid flow problem using techniques of computational fluid dynamics	3	-	-	-	3	-	-	-	-	-	-	-	1	-
Course Code	192TE1E01-ADVANCED IC ENGINES, ELECTRIC AND HYBRID VEHICLES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Analysing the gas exchange process during combustion process	2	1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	Predict the charge motion behaviour with in the cylinder	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO3	Describe the combustion phenomena of SI and CI engines.	2	1	-	-	-	-	-	-	-	-	-	2	-	-
CO4	Understanding the electric vehicle technology.	2	1	-	-	1	1	-	-	-	-	1	2	-	-
CO5	Explain the role of hybrid and fuel cell vehicles during transition time	2	2	-	-	-	1	-	-	-	-	1	2	-	-
Course Code	192TE1E02-GAS DYNAMICS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand fundamental of gas dynamics	3	3	-	-	-	-	-	-	-	-	-	3	1	-
CO2	Understand working of compressors, turbines etc.	3	3	-	-	-	-	-	-	-	-	-	3	1	-
CO3	Understand working of jet propulsion cycles	3	3	-	-	-	-	-	-	-	-	-	3	1	-

	CO Statements	POs											PSOs		
CO4	Able to do analysis of jet propulsion systems	3	3	-	-	-	-	-	-	-	-	-	3	1	-
Course Code	192TE1E03-CRYOGENIC ENGINEERING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Analyse and evaluate various refrigeration cycles	3	2	2	-	-	-	-	-	-	-	-	2	-	-
CO2	Explain the effect of various refrigerants on the environment	3	2	1	-	-	-	-	-	-	-	-	2	-	-
CO3	Possess basic knowledge of cryogenics	3	2	1		1	-	-	-	-	-	1	2	-	-
CO4	Design cryogenic systems	2		1	2	1	-	-	-	-	-	1	2	-	-
CO5	Find applications of cryogenics	2	-	1		1	-	-	-	-	-	1	2	-	-
Course Code	192TE1E04-ADVANCED THERMODYNAMICS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Analyze the role of thermodynamic properties such as internal energy, enthalpy, entropy, temperature, pressure and specific volume along with their relationships	3	3	-	-	-	-	-	-	-	-	-	1	2	-
CO2	Solve problems using the properties and relationships of thermodynamic fluids and mixture of gas	3	2	-	-	-	-	-	-	-	-	-	1	2	-
CO3	Solve problems on different pure substances with the understanding of various phase diagrams and using Mollier's chart	3	2	1	-	-	-	-	-	-	-	-	1	2	-
CO4	Apply the conservation of mass to reacting systems to determine balanced reaction equations and calculate the enthalpy of reaction, enthalpy of combustion, and the heating values of fuels	2	1	1	-	-	-	-	-	-	-	-	1	2	-
Course Code	192TE1E05-GAS TURBINES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain gas turbine cycles for shaft power	3	2	-	3	3	-	3	-	-	-	3	-	-	2
CO2	Explain fundamentals of rotating machines and centrifugal compressors	3	3	-	3	3	-	3	-	-	-	3	-	-	2
CO3	Discuss construction and principle of operation for axial flow compressors	3	3	-		2	-	-	-	-	-	-	2	-	
CO4	Explain operational requirements for gas turbine systems	3	2	-	3	3	-	3	-	-	-	3	-	-	2
CO5	Explain construction and operation of radial flow turbines	3	2	-	3	3	-	3	-	-	-	3	-	-	2
Course Code	192TE1E06-ALTERNATIVE FUEL TECHNOLOGIES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Need of alternative fuels and Engine requirement in an IC Engine	3	3	-	3	3	-	3	-	-	1	3	-	-	2
CO2	Explain the method of production liquid fuels like gasoline, alcohol, vegetable oils in IC engine	3	3	-	3	3	-	3	-	-	1	3	-	-	2
CO3	Explain the performance, and emission characteristics of using alternative fuels in engine	3	2	-		2	-		-	-	1	-	2	-	-
CO4	Production and safety aspects of Gaseous fuel like biogas, LPG and Hydrogen of SI and CI engines	3	2	-	3	3	-	3	-	-	1	3	-	-	2
CO5	Explain the fuel cell, dual fuel combustion and surface ignition to use alternative fuel in engine	2	3	-	3	3	-	3	-	-	1	3	-	-	2
Course Code	192TE1E07-ENERGY CONSERVATION AND MANAGEMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Develop knowledge to identify, explain and compare competing energy resources, conversion technologies on an economic and efficiency basis	3	3	-	-	-	-	3	-	-	1	-	3	1	-

	CO Statements	POs											PSOs		
CO2	Understand the significance of course contents and develop capability to apply different tools to assess the validity of energy conversion claims	3	3	-	-	-	-	3	-	-	1	-	2	1	-
CO3	Analyze different energy systems and related economics	3	3	-	2	-	-	-	-	-	1	-	3	1	-
CO4	Evaluate different energy resources, their conversion and management	3	3	-	3	-	-	-	-	-	1	-	2	1	-
Course Code	192TE1E08-THEORY AND TECHNOLOGY OF FUEL CELLS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Possess basic knowledge of electrochemical energy conversion	3	3	-	3	3	-	3	-	-	1	3	-	-	2
CO2	Evaluate the performance of fuel cells under different operating conditions	3	3	-	3	3	-	3	-	-	1	3	-	-	2
CO3	Analyze Low and High Temperature Fuel Cells	3	2	-	-	2	-	-	-	-	1	-	2	-	-
CO4	Possess basic knowledge of Fuel Processing	3	2	-	3	3	-	3	-	-	1	3	-	-	2
CO5	Possess basic knowledge of designing Fuel Systems	2	3	-	3	3	-	3	-	-	1	3	-	-	2
Course Code	192HS1T01-RESEARCH METHODOLOGY AND IPR	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand research problem formulation	3	3	-	3	-	-	-	-	3	2	-	2	2	-
CO2	Analyze research related information	3	3	-	3	-	-	-	-	3	3	-	2	2	-
CO3	Demonstrate research ethics	3	3	-	3	-	-	-	-	3	3	-	2	2	-
CO4	Explain the today's world is controlled by Computer, Information Technology, but tomorrow world will be ruled by ideas, concept, and creativity	3	3	-	3	-	-	-	-	2	2	-	2	2	-
CO5	Discuss that when IPR would take such important place in growth of individuals & nation, it is needless to emphasise the need of information about Intellectual Property Right to be promoted among students in general & engineering in particular	3	3	-	3	-	-	-	-	2	3	-	2	2	-
CO6	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	3	3	-	3	-	-	-	-	3	2	-	2	2	-
Course Code	192TE1L01-COMPUTATIONAL FLUID DYNAMICS LAB – I	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Student will be able to apply the skill learnt in theory subjects to do hands on simulations	3	-	-	3	-	-	-	-	-	-	-	-	-	3
CO2	Students will be able to 2-D and 3-D modelling and meshing	3	-	-	3	-	-	-	-	-	-	-	-	-	3
CO3	Students will be able to analyze results of numerical simulation of thermal and fluid flow problems	3	-	-	3	-	-	-	-	-	-	-	-	-	3
Course Code	192TE1L02-THERMAL ENGINEERING LAB-I	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Estimate the convective heat transfer coefficient in various conditions	3	3	-	-	-	-	1	-	-	-	-	3	-	1
CO2	Evaluate the performance of heat exchanger in various arrangements	3	3	-	-	-	-	1	-	-	-	-	3	-	1
CO3	Calculate the heat transfer through a pin-fin	3	3	-	-	-	-	-	2	-	-	-	3	-	1
CO4	Compute the emissivity of different bodies	3	3	-	-	-	-	1	-	-	-	-	3	-	1

	CO Statements	POs											PSOs		
CO4	Demonstrate the passage of the Hindu Code Bill of 1956.	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Course Code	192MC1A06 -Pedagogy Studies	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Distinguish the various pedagogical practices are being used by teachers informal and informal classrooms in developing countries.	-	-	-	-	-	-	-	-	1	-	-	-	-	1
CO2	Explain the evidence on the effectiveness of various kinds of pedagogical practices, indifferent conditions.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO3	Discuss the teacher's attitudes and beliefs in line with pedagogic strategies.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO4	Prepare school curriculum and guidance material best support effective pedagogy.	-	-	-	-	-	-	-	-	1	-	-	-	-	-
CO5	List the research gaps.	-	-	-	-	-	-	-	-	1	-	-	1	1	3
Course Code	192MC1A07 -Stress Management by Yoga	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Develop healthy mind in a healthy body to improve social health	-	-	-	-	-	-	-	-	1	-	-	-	-	-
Course Code	192MC1A08 -Personality Development through Life Enlightenment Skills	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Develop his/her personality and achieve the highest goal in life.	-	-	-	-	-	-	-	-	1	-	-	-	-	1
CO2	Capable of lead the nation and mankind to peace and prosperity.	-	-	-	-	-	-	-	-	1	-	-	-	-	1
CO3	Develop versatile personality of students.	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Course Code	192MC1A09 -Soft Skills	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Summarize the basic grammatical skills.	-	-	-	-	-	-	-	2	-	-	-	-	1	1
CO2	Understand interview skills & importance of business etiquette.	-	-	-	-	-	-	-	2	-	-	-	-	1	1
CO3	Apply typical write-up skills for business need.	-	-	-	-	-	-	-	2	-	-	-	-	1	1
CO4	Prepare a professional resume.	-	-	-	-	-	-	-	2	-	-	-	-	1	1
CO5	Use the tools of the soft skills.	-	-	-	-	-	-	-	2	-	-	-	-	1	1
II SEM															
Course Code	192TE2T03-ADVANCED HEAT AND MASS TRANSFER	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain the general heat conduction equation, fin heat transfer, solution of two dimensional steady and un-steady state equation, and conduction shape factor	3	2	-	-	-	-	-	-	-	-	-	3	1	-
CO2	Describe the solution of transient heat conduction equation by analytical methods and by Heisler's charts	3	2	-	-	-	-	-	-	-	-	-	3	1	-
CO3	Determine the heat transfer coefficient in natural and free convection with the understanding of heat convection equations	3	2	-	-	-	-	-	-	-	-	-	3	1	-
CO4	Describe the solution of laminar heat transfer for flow over a flat plate and analyse heat transfer in laminar and turbulent flows through pipe, liquid metal and high-speed flow	3	2	1	-	-	-	-	-	-	-	-	3	1	-

	CO Statements	POs											PSOs			
CO5	Describe pool, flow boiling, compare external and in-tube film condensation, and explain working of a heat pipe along with the understanding of mass diffusion principles	3	2	-	-	-	-	-	-	-	-	-	-	3	1	-
Course Code	192TE2T04-THERMAL MEASUREMENTS AND PROCESS CONTROLS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Making the student conversant with different working principles of various instruments	2	2	-	-	-	-	2	-	-	-	-	2	2	-	
CO2	Making the student to learn in the transduction of the signals	2	2	-	-	-	-	2	-	-	-	-	2	2	-	
CO3	Analyze the behavior of an instrument in the measurement process	2	2	-	-	-	-	3	-	-	-	-	2	2	-	
CO4	Analyze and design an instrumentation system, dealing with the concepts of dynamic range, signal noise ratio, and error budget	3	3	-	-	-	-	2	-	-	-	-	2	2	-	
CO5	Build, program, calibrate and use a microprocessor-based instrumentation system	3	3	-	-	-	-	2	-	-	-	-	2	2	-	
Course Code	192TE2E09-EQUIPMENT DESIGN FOR THERMAL SYSTEMS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Perform economic analysis of a thermal system.	3	3	-	2	-	-	-	-	-	-	-	-	2	-	
CO2	Design turbomachines and heat exchangers	3	3	-	2	-	-	-	-	-	-	-	-	2	-	
Course Code	192TE2E10-SOLAR ENERGY TECHNOLOGIES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Demonstrate the generation of electricity from various Non-Conventional sources of energy, have a working knowledge on types of fuel cells	3	3	-	2	-	-	-	-	-	1	-	2	2	-	
CO2	Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation	3	3	-	2	-	-	-	-	-	1	-	2	2	-	
CO3	Estimate the solar energy, Utilization of it, Principles involved in solar energy collection and conversion of it to electricity generation	3	3	-	2	-	-	-	-	-	1	-	2	2	-	
CO4	Explore the concepts involved in wind energy conversion system by studying its components, types and performance	3	3	-	2	-	-	-	-	-	1	-	2	2	-	
Course Code	192TE2E11-ADVANCED POWER PLANT ENGINEERING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Apply the principles of thermodynamics to analyse the performance of steam, gas, combined and modern power plants	2	1	-	-	2	2	-	-	-	-	-	2	-	-	
CO2	Design and develop power plant components for optimum performance	2	1	-	2	-	-	3	-	-	-	-	2	-	-	
CO3	Select appropriate site and technology for hydroelectric, and nuclear power plants	2	1	-	2	-	-	-	-	-	-	-	2	-	2	
CO4	Evaluate economic and environmental implications on power plants	2	-	1	1	-	-	-	-	-	-	-	-	-	2	
Course Code	192TE2E12-COMBUSTION, EMISSIONS AND ENVIRONMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Explain the chemical composition, kinematic reaction, and types of order reaction	2	2	-	-	-	-	-	-	-	-	-	2	-	-	

	CO Statements	POs											PSOs			
CO2	Explain the various thermodynamics of combustion and adiabatic flame temperature	2	2	-	-	-	-	-	-	-	-	-	-	2	-	-
CO3	Explain the structure and flame propagation of Laminar and Turbulent Flow	3	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	Explain the various method of measurement and control of pollutants	3	3	-	2	-	-	-	-	-	3	-	-	3	-	-
CO5	Explain the effects of environment and human effects in environmental consideration	3	2	-	1	-	-	-	-	-	2	-	-	2	-	-
Course Code	192TE2E13-JET PROPULSION AND ROCKET ENGINEERING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Explain the working of jet engines and rocket propulsion systems	2	-	-	-	-	-	-	-	-	-	-	2	-	-	
CO2	Describe liquid propellant rocket engines	2	-	-	-	-	-	-	-	-	-	-	2	-	-	
CO3	Discuss solid propellant rocket engines and explain rocket motor design approach	2	2	-	1	-	-	-	-	-	-	-	2	-	-	
CO4	Classify solid propellants and discuss the characteristics	2	2	-	-	-	-	-	-	-	-	-	2	-	-	
CO5	Explain the working of hybrid propellant rockets and select the process for rocket propulsion systems	2	-	-	-	-	-	-	-	-	-	-	2	-	-	
Course Code	192TE2E14-AUTOMOTIVE ENGINEERING	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Explain the concepts of Automotive Power plant	2	2	-	-	-	-	-	-	-	-	-	2	-	-	
CO2	Identify the constructional and working principle of fuel, ignition and electrical system of a typical automobile	2	2	-	2	-	-	-	-	-	2	-	2	-	-	
CO3	Identify the different constructional features and working principles of un-sprung components of the given vehicle	2	2	-	-	-	-	-	-	-	-	-	2	-	-	
CO4	Identify the different constructional features and working principles of sprung components of the given vehicle	3	2	-	-	-	-	-	-	-	2	-	2	-	-	
CO5	Explain the different Active and Passive vehicle safety systems	3	2	-	1	-	-	-	-	-	3	-	2	-	-	
Course Code	192TE2E15-MODELING OF IC ENGINES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Making the student conversant with various engine cycles	2	2	-	-	-	-	-	2	-	-	-	-	2	-	
CO2	Analyze the performance of turbo charging and super charging	2	2	-	-	-	-	-	2	-	-	-	-	2	-	
CO3	Analyze the behavior of the combustion process in SI engine and CI engine	2	2	-	-	-	-	-	3	-	-	-	-	2	2	
CO4	Making the student conversant with awareness in the pollution formation and control	3	3	-	-	-	-	2	-	-	-	-	-	2	-	
CO5	Analyze the behavior of engine heat transfer and latest trend in I.C Engines	3	3	-	-	-	-	2	-	-	-	-	-	2	2	
Course Code	192TE2E16-RENEWABLE ENERGY TECHNOLOGIES	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Apply thermal science fundamentals to the design/analysis of renewable energy system components	3	3	-	3	3	-	3	-	-	1	3	-	-	2	
CO2	Expose students to the diversity of beneficial applications currently utilizing renewable energy	3	3	-	3	3	-	3	-	-	1	3	-	-	2	

	CO Statements	POs											PSOs		
CO3	To complete conceptual design problems based upon state-of-the-art scenarios for utilizing renewable energy within developing or developed regions	3	2	-	-	2	-	-	-	-	1	-	2	-	-
CO4	Introduce students to societal catalysts and challenges regarding renewable energy Implementation	3	2	-	3	3	-	3	-	-	1	3	-	-	2
Course Code	192TE2L03-COMPUTATIONAL FLUID DYNAMICS LAB-II	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Able to perform Static Structural Analysis of a Rectangular Plate and composite plates	3	-	-	3	-	-	-	-	-	-	-	-	-	3
CO2	Students will be able to 2-D and 3-D modelling and meshing	3	-	-	3	-	-	-	-	-	-	-	-	-	3
CO3	Perform 2D and 3D flow analysis of a pipe	3	-	-	3	-	-	-	-	-	-	-	-	-	3
CO4	Study the parameters of rotating components	3	-	-	3	-	-	-	-	-	-	-	-	-	3
CO5	Perform transient analysis on pipes and cylinders	3	-	-	3	-	-	-	-	-	-	-	-	-	3
Course Code	192TE2L04-THERMAL ENGINEERING LAB – II	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Evaluate the Calorific Value of fuel and calculating the performance of rotary and reciprocating air compressor	3	3	-	-	-	-	1	-	-	-	-	3	-	1
CO2	Evaluate the performance of solar flat plate collector	3	3	-	-	-	-	1	-	-	-	-	3	-	1
CO3	Calculate the heat transfer through a pin-fin	3	3	-	-	-	-	2	-	-	-	-	3	-	1
CO4	Calculate the Dryness Fraction of the calorimeter	3	3	-	-	-	-	1	-	-	-	-	3	-	1
CO5	Evaluate the performance of Shell and Tube heat exchanger	3	3	-	-	-	-	1	-	-	-	-	3	-	1
Course Code	192TE2P01-MINI PROJECT WITH SEMINAR	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Student will be able to apply the skill of presentation and communication techniques	3	-	-	-	-	-	-	3	-	-	1	2	-	-
CO2	Student will be able to use the knowledge of the fundamentals of subjects to search the related literature	3	-	-	-	2	-	-	-	-	-	1	2	-	-
CO3	Student will be able to analyse the available resources and select most appropriate one	3	-	-	2	-	-	-	-	-	-	-	2	2	-
CO4	Students will be able to apply a multidisciplinary strategy to address current, real-world issues.	3	-	-	3	2	-	-	3	-	-	1	2	-	2
Course Code	192MC2A01-English for Research Paper Writing	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand how to improve the writing skills and level of readability.	-	-	-	2	-	-	-	2	2	-	-	1	2	3
CO2	Illustrate what to write in each section.	-	-	-	2	-	-	-	2	2	-	-	1	2	3
CO3	Understand the skills needed when writing a Title Ensure the good quality of paper at very first-time submission.	-	-	-	2	-	-	-	2	2	-	-	1	2	3
Course Code	192MC2A02-Disaster Management	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response.	-	-	-	-	-	-	-	-	-	1	-	-	-	3
CO2	Evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.	-	-	-	-	-	-	-	-	-	1	-	-	-	3

	CO Statements	POs											PSOs			
CO3	Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.	-	-	-	-	-	-	-	-	-	-	1	-	2	-	3
CO4	Understand the strengths and weaknesses of disaster management approaches, planning and programming in different countries, particularly their home country or the countries they work in.	-	-	-	-	-	-	-	-	-	1	-	2	1	3	
Course Code	192MC2A03-Sanskrit for Technical Knowledge	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Understanding basic Sanskrit language.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
CO2	Develop the brain functioning in association with Sanskrit Language.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
CO3	Use logical language will help to develop logic in students.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
CO4	Understand the importance of Sanskrit Language to explore ancient literature.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
Course Code	192MC2A04-Value Education	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Understand value of education and self- development.	-	-	-	-	-	-	-	-	-	1	-	-	-	1	
CO2	Explain the need of good values in students.	-	-	-	-	-	-	-	-	-	1	-	-	-	1	
CO3	Developing the overall personality.	-	-	-	-	-	-	-	-	-	1	-	-	-	1	
CO4	Explain the need of character in a student.	-	-	-	-	-	-	-	-	-	1	-	-	-	1	
Course Code	192MC2A05-Constitution of India	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Describe growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
CO2	Explain the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
CO3	Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
CO4	Demonstrate the passage of the Hindu Code Bill of 1956.	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
Course Code	192MC2A06-Pedagogy Studies	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3	
CO1	Distinguish the various pedagogical practices are being used by teachers informal and informal classrooms in developing countries.	-	-	-	-	-	-	-	-	1	-	-	-	-	1	
CO2	Explain the evidence on the effectiveness of various kinds of pedagogical practices, indifferent conditions.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
CO3	Discuss the teacher's attitudes and beliefs in line with pedagogic strategies.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
CO4	Prepare school curriculum and guidance material best support effective pedagogy.	-	-	-	-	-	-	-	-	1	-	-	-	-	-	
CO5	List the research gaps.	-	-	-	-	-	-	-	-	1	-	-	1	1	3	

	CO Statements	POs											PSOs		
Course Code	192PD3005-INDUSTRIAL SAFETY	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand the general industrial requirements like lighting, cleanliness prevention from hazards and accidents	2		-	-	-	-	-	-	-	-	-	-	-	-
CO2	Analyze maintenance requirements of the industry and cost associated	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Analyze wear and corrosion aspects of the industry and their prevention	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Identify the faults prone areas and their repair and periodic maintenance	2		-	-	-	-	-	-	-	-	-	-	-	-
Course Code	192PD3006-COMPOSITE MATERIALS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand characteristics and advantages of composite materials	2		-	-	-	-	-	-	-	-	-	-	-	-
CO2	Acquire knowledge of reinforcement, glass fiber, etc	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO3	Identify the usage of metal matrix composites	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	Understand manufacturing of polymer matrix composites	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	Identify different types of failures	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Course Code	192TE3001-ENERGY SYSTEMS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain the working principle of various energy systems	2	-	-	-	-	1	-	-	-	-	-	-	-	-
CO2	Calculate the availability analysis of the energy systems and cycles	2	1	2	-	-	1	-	-	-	-	-	-	-	-
CO3	Explain the design and working principles of combustion systems	2	1	1	-	-	1	-	-	-	-	-	-	-	-
CO4	Explain the thermal energy auditing technologies and procedures	2	1	1	-	-	1	-	-	-	-	-	-	-	-
CO5	Analyse various types of energy storage devices and perform the selection based on techno-economic view point	2	1	1	1	-	1	-	-	1	1	-	-	-	-
CO6	Explain various measurement techniques useful for the evaluation of Energy Conservation Schemes	2		1		-	1	-	-	1	1	-	-	-	-
Course Code	192TE3002-FUELS AND COMBUSTION	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Explain detailed classification of solid fuels and their conversion process	1	1	1	-	-	-	-	-	-	-	-	-	-	-
CO2	Differentiate various rate of reactions	1	1	1	-	-	-	-	-	-	-	-	-	-	-
CO3	Evaluate thermodynamics related to combustion process	3	2	2	2	-	-	-	-	1		1	-	-	-
CO4	Explain the parameters involved in Flame propagation	1	1	1	1	-	-	-	-	-	-	-	-	-	-
CO5	Identify the various sources of air pollution	1	1	1	1	-	-	-	-	-	-	-	-	-	-
Course Code	192TE3003-GREEN ENGINEERING TECHNOLOGY	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Distinguish the various solar energy collection methods and measuring instruments	3	1	-	3	-	-	-	-	3	2	-	-	-	-
CO2	Explain the different methods of solar energy storage and their applications	3	3	1	3	-	-	1	-	3	3	-	-	-	-
CO3	Illustrate the various types of wind mills and performance characteristics	3	3	2	1	-	-	1	-	2	2	-	-	-	-
CO4	Explain the principle of Biomass production, Geothermal energy sources and Ocean thermal energy conversion	3	3	2	1	-	-	1	-	2	2	-	-	-	-

	CO Statements	POs											PSOs		
Course Code	192ES3003-PROGRAMMING LANGUAGES FOR EMBEDDED SYSTEMS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Develop the moderate complex programs in embedded C	1		1	-	-	-	-	-	-	-	-	-	-	-
CO2	Compare the different programming techniques in object-oriented programming	2	3		-	-	-	-	-	-	-	-	-	-	-
CO3	Analyze the algorithm in C++.	1		1	-	-	-	-	-	-	-	-	-	-	-
CO4	Distinguish the different types of overloading & Inheritance	2			-	-	-	-	-	-	-	-	-	-	-
CO5	Understand the templates and scripting languages		1		-	-	-	-	-	-	-	-	-	-	-
Course Code	192ES3004-SENSORS AND ACTUATORS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Classify various sensors/transducers based on their applications				2	2	1		-		-		-	-	-
CO2	Dissect various types of Resistive, Inductive and Capacitive Sensors	2	3		3	3	3		-	3	-	3	-	-	-
CO3	Analyze various approaches, procedures and results related to Thermal and Magnetic sensors	2	3	2	3	3	1		-	3	-	3	-	-	-
CO4	Examine the radiation sensors based on their characteristics	2	3	2	3	3		2	-	3	-	3	-	-	-
CO5	Apply Smart Sensors in the field of Communication, Automation and Manufacturing	1	3	1	3	3	2		-	3	-	2	-	-	-
CO6	Perceive various control values and types of actuators	3	3		3	3	3		-	3		3	-	-	-
Course Code	192VD3001-PHYSICAL DESIGN AUTOMATION	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Understand the relationship between design automation algorithms and various constraints posed by VLSI fabrication and design technology		1		2		-	-	-	-	-	-	-	-	-
CO2	Adapt the design algorithms to meet the critical design parameters		3		3		-	-	-	-	-	-	-	-	-
CO3	Identify layout optimization techniques and map them to the algorithms	1			3		-	-	-	-	-	-	-	-	-
CO4	Develop proto-type EDA tool and test its efficacy					3	-	-	-	-	-	-	-	-	-
CO5	Analyze the different partitioning algorithms and its evolution	2	3				-	-	-	-	-	-	-	-	-
Course Code	192VD3002-VLSI TECHNOLOGY	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Summarize characteristics of MOS transistors	3	2		-	-	-	-	-	-	-	-	-	-	-
CO2	Outline the MOS fabrication process and short channel effects	3	2	2	-	-	-	-	-	-	-	-	-	-	-
CO3	Identify the basic rules in layout designing	3	3	2		3	-	-	-	-	-	-	-	-	-
CO4	Analyze various combinational logic networks and sequential systems	3	3	2	2	3	-	-	-	-	-	-	-	-	-
Course Code	192VD3003-NANO-ELECTRONICS	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	Demonstrate challenges due to scaling on CMOS devices	-	3	-	2	2	3		1	1	1	3			
CO2	Analyse and explain working of novel MOS based silicon devices and various multi gate devices	2	3	2	2	2	3		1	1	1	3	-	-	-
CO3	Analyse working of spin electronic devices	2	3	2	2	2	3		1	1	1	3	-	-	-
CO4	Summarize nano electronics systems and building blocks such as: low dimensional semiconductors, hetero structures, carbon nano tubes, quantum dots, nanowires etc	1	2		3								-	-	-

