ADITYA ENGINEERING COLLEGE

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Department of Mechanical Engineering

M.Tech. (Thermal Engineering) -AR17 -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	**172TE1T01 - OPTMIZATION TECHNIQUES & APPLICATIONS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Solve the single variable non-linear unconstrained optimization problems.	3	2	1	-	3	3	3	-	-	-	-	3	3	-
CO2	Calculate the multi- variable non-linear unconstrained optimization problems	3	2	1	-	-	-	-	3	-	-	3	-	3	-
CO3	Evaluate the sensitivity analysis of multi-variable linear programming problems.	3	3	2		-	3	-	3	-	-	3	-	3	-
CO4	Solve the integer programming optimization problems using branch and bound methods	3	3	3	3	-		-	3	-	-	-	3	-	-
CO5	Explain the probability theory by using stochastic programming.	3	2	1	-	-	-			-	-	-	3	3	-
Course Code	**172TE1T02 - ADVANCED THERMODYNAMICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain Maxwell's and thermodynamic relations of gas mixtures.	**2**	**1**	-	-	**2**	**2**	-	-	-	**3**	-	2	2	-
CO2	Identify the models to estimate the properties of real gases.	**2**	**1**	-	-	**2**	**2**	-	-	-	**3**	-	2	2	-
CO3	Analyze chemical reaction and combustion of gas-mixtures	-	**3**	**2**	-	-	-	-	-	-	-	-	-	-	1
CO4	Compare vapour and Gas power cycles.	-	**3**	**2**	-	-	-	-	-	-	-	-	-	-	1
CO5	Apply the knowledge of Direct Energy Conversion of Fuel Cells.	**3**	**2**	**1**	-	**3**	**3**	-	-	-	-	-	3	3	-

	CO Statements	POs											PSOs		
Course Code	**172TE1T03 - ADVANCED HEAT AND MASS TRANSFER**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Develop heat conduction equation for various conditions and solve 1-D and 2-D.	**3**	**2**	**-**	**1**	**-**	**3**	**-**	**-**	**3**	**-**	**-**	3	-	-
CO2	Apply the conservation equations on forced convection & free convection and their effects.	**3**	**2**	**-**	**1**	**-**	**3**	**-**	**-**	**3**	**-**	**-**	3	-	-
CO3	Analyze the effect of various parameters on the convective heat transfer and phenomenon of boiling and condensation	**3**	**2**	**-**	**1**	**-**	**3**	**-**	**-**	**3**	**-**	**-**	3	-	-
CO4	Compute the heat transfer rate through radiation.	**3**	**3**	**-**	**2**	**-**	**3**	**-**	**-**	**3**	**-**	**-**	3	-	-
CO5	Discuss the phenomenon of convective mass transfer.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	-
Course Code	**172TE1T04 - ADVANCED FLUID MECHANICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Examine the various flow patterns and three dimensional continuity equations	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	-	-
CO2	Solve Navier-stoke's equation for the exact solutions of Coutte flow, Poisoulie flow and Hagen poisoulle flow	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	-
CO3	Apply the boundary layer concept to the fluid flow problems	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	-
CO4	Compute the equations for lift on circular cylinders and smooth and rough boundaries for internal flow	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	-	-
CO5	Analyze the performance of nozzles, diffusers and Fanno, Raleigh flows along the shocks waves and Mach number flow regimes.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	-	-
Course Code	**172TE1E01 - GAS DYNAMICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the concept of compressible flow and its governing equations.	**2**	**1**		**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	2	-	-
CO2	Solve flow equations for quasi one dimensional by using governing equations and Theorems	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	3	-	-
CO3	Analyze various waves with governing equations and relations.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	2	-	-
CO4	Examine the two dimensional flow through variable area ducts	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	2	-	-
CO5	Applying wave propagation theories and other theories to different waves.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	3	-	-

	CO Statements	POs											PSOs		
Course Code	**172TE1E02 - REFRIGERATION & CRYOGENICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the vapor compression refrigeration systems and Vapour absorption system.	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	3	-	-
CO2	Select the refrigerant based on the load requirement.	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	3	-	-
CO3	Explain the effect of Joule-Thompson Coefficient and liquefaction of various gases.	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	3	-	-
CO4	Evaluate the effect of low temperatures on various properties.	**3**	**3**	**-**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**3**	3	-	-
CO5	Discuss about the liquid gases container.	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**2**	**3**	**-**	**2**	2	-	-
Course Code	**172TE1E03 - RENEWABLE ENERGY TECHNOLOGIES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the concepts involved in solar energy	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	-
CO2	Discuss about geothermal energy with its limitations	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	3	-	-
CO3	Analyze the performance of direct energy systems	**1**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	-	-
CO4	Distinguish the wind energy systems	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	1	-	-
CO5	Evaluate the performance of tidal energy plants.	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	2	-	-
Course Code	**172TE1E04 - THEORY AND TECHNOLOGIES OF FUEL CELLS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Identify the relevance of various fuel cells.	**3**	**2**	**-**	**1**	**3**	**3**		**3**			**3**	3	3	-
CO2	Explain the different modeling systems.	**2**	**1**	**-**		**2**	**2**	**2**	**2**	**2**	**2**	**2**	2	2	-
CO3	Compare low and high temperature fuel cell.	**-**	**-**	**-**	**1**		**3**	**-**	**-**	**-**	**-**	**-**	-	-	-
CO4	Apply the design principles of fuel cells.	**3**	**2**	**-**	**1**	**3**	**3**		**3**	**-**	**-**	**3**	3	3	-
CO5	Identify various fuel cell system components along with its layout.	**3**	**2**	**-**	**1**	**3**	**3**		**3**	**-**	**-**	**3**	3	3	-

	CO Statements	POs											PSOs		
Course Code	**172TE1E05 - ADVANCED I.C. ENGINES**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze engine cycles and the factors responsible for making the cycle different from the Ideal cycle		-	-	2	-	-	-	-	-	-	-	-	-	-
CO2	Calculate the volumetric efficiency, mean velocity and turbulent characteristics of the gas exchange processes	3	-	-	1		3		3		-	-	3	3	-
CO3	Distinguish between SI and CI engines of normal and abnormal combustion		-	-	2						-	-	-	-	-
CO4	Demonstrate the pollution formation of IC engine and their control methods.	2	-	-	-		2	3	2	3	-	-	2	2	-
CO5	Explain the latest trend in IC engines and engine heat transfer principals.	3	-	-	1				3		-	-	3	3	-
Course Code	**172TE2E06 - SOLAR ENERGY TECHNOLOGY (PROFESSIONAL ELECTIVE-II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the various types of solar radiation measuring instruments and solar collectors	3	3	-	3	-	-	-	-	3	-	-	3	3	-
CO2	Evaluate different types of solar heating system and the working principal.	3	3	-	2	-	-	-	-	3	-	-	3	-	-
CO3	Apply the knowledge of construction of thermal energy storage systems	3	2	-	2	-	-	-	-	3	-	-	3	3	-
CO4	Summarize the importance of direct energy conversion system	2	1	-	1	-	-	-	-	3	-	-	2	2	-
CO5	Describe the basic economics of solar system	2	1	-	2			3		3	-	-	2	2	-
Course Code	**172TE1E07 - TURBO MACHINES (PROFESSIONAL ELECTIVE-II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Develop various equations for thermodynamic and performance parameters of turbo machines.	3	2	-	1	-	-	-	3	3	-	3	3	-	-
CO2	Determine the various parameters for smooth flow through nozzle.	3	2	-	1	-	-	-	3	3	-	3	3	-	-
CO3	Calculate the various geometrical and performance parameters for an impulse turbine and and flow parameters for sonic and supersonic flow.	3	2	-	1	-	-	-	3	3	-	3	3	-	-
CO4	Compute the various geometrical and performance parameters for a centrifugal compressor and an axial flow compressor.	3	3	-	2	-	-	-	3	3	-	3	3	-	-
CO5	Discuss various losses that occur in a turbo machines.	3	2	-	1	-	-	-	3	3	-	3	3	-	-

	CO Statements	POs											PSOs		
Course Code	**172TE1E08 - ALTERNATIVE FUELS TECHNOLOGIES (PROFESSIONAL ELECTIVE-II)**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the need of alternative fuels.	**3**	**2**	**1**	**1**	**3**	**3**		**3**			**3**	3	3	-
CO2	Classify different types of liquid alternative fuels.	**2**	**1**			**2**	**2**	**2**	**2**	**2**	**2**	**2**	2	2	-
CO3	Estimate the engine performance & emission characteristics by using liquid alternative fuels			**1**	**1**		**3**						-	-	-
CO4	Determine the working of SI/CI engine with various gaseous fuels.	**3**	**2**	**1**	**1**	**3**	**3**		**3**			**3**	3	3	-
CO5	Identify several methods of alternative fuels for improving the performance of fuel cells.	**3**	**2**	**1**	**1**	**3**	**3**		**3**			**3**	3	3	-
Course Code	**172TE1L01 - THERMAL ENGINEERING LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Compare thermal conductivities of various metals experimentally	**2**	**1**			**1**	**1**	**2**	**1**	**2**	**2**	**1**	2	2	-
CO2	Estimate the COP of VCR System.	**-**	**-**	**1**	**1**			**1**	**-**	**-**	**-**	**-**	-	-	2
CO3	Calculate the Drag & Lift forces of symmetrical aerofoil.	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	2
CO4	Test the VCR engine for emissions characterization.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	1
CO5	Examine the throttling	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-
II SEM															
Course Code	**172TE2T05 - FUELS, COMBUSTION & ENVIRONMENT**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze various types of fuels and their properties.	**3**	**3**	**2**	**2**	**-**	**3**		**3**	**-**	**-**	**-**	3	-	-
CO2	Explain the chemical composition of fuel and the measuring procedure.	**2**	**1**			**-**	**2**		**2**	**-**	**-**	**-**	2	-	-
CO3	Estimate the thermodynamic properties of the fuel.	**2**	**1**			**-**	**2**		**2**	**-**	**-**	**-**	2	-	-
CO4	Determine the properties of flame and the combustion of fuel.	**3**	**2**	**1**	**1**	**-**	**3**		**3**	**-**	**-**	**-**	3	-	-
CO5	Summarize the effect of pollution on the environment & controlling methods.	**2**	**1**			**-**	**2**		**2**	**-**	**-**	**-**	2	-	-

	CO Statements	POs											PSOs		
Course Code	**172TE2T06 - ENERGY MANAGEMENT**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Describe the technologies of energy management	-	-	-	**2**	-	-	-	-	-	-	-	3	3	-
CO2	Summarize the sources of energy loss and target savings in energy conservation of management principals.	-	-	-	**1**	-	-	-	-	-	-	-	3	3	-
CO3	Analysis the Economic investment projects	-	-	-	**2**	-	-	-	-	-	-	-	-	-	-
CO4	Analyzing the different types of rate of returns to evaluate the projects.	-	-	-	**2**				**3**				3	2	-
CO5	Explain different activities and characteristics of alternate energy source.	**3**	**2**		**1**	**2**		**3**	**3**		**3**		3	3	-
Course Code	**172SE2T05 - FINITE ELEMENT METHOD**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze structural mechanics problems by using variational & weight residual methods	**3**	**3**	**2**	-	-	-	-	-	-	-	**3**	3	-	-
CO2	Evaluate the finite element equations for one dimensional problem	**3**	**2**	**1**	-	-	-	-	-	-	-	**3**	3	-	-
CO3	Solve heat transfer problems on two dimensional fins with different boundary conditions.	**3**	**2**	**1**	-	-	-	-	-	-	-	-	3	-	-
CO4	Distinguish isoperimetric formulations and interpolation functions	**3**	**3**	**3**	-	-	-	-	-	-	-	-	3	-	-
CO5	Determine Eigen values and Eigen vectors for dynamic systems.	**3**	**3**	**3**	-	**3**	-	-	-	-	-	**3**	3	3	-
Course Code	**172TE2T07 - COMPUTATIONAL FLUID DYNAMICS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain mathematical models for flow phenomena.	**3**	**2**		**1**		**3**	-		**3**	-	-	###	2	-
CO2	Analyze methods for fluid flow and heat transfer simulations	**3**	**2**		**1**		**3**	-		**3**	-	-	-	-	1
CO3	Compare the compressible and incompressible flows.	**3**	**2**		**1**		**3**	-		**3**	-	-	-	-	1
CO4	Use the finite volume method.	**3**	**3**		**2**		**3**	-		**3**	-	-	###	3	-
CO5	Solve problems on linear fluid flow, steady state, transient state.	3	2	1	-	3	3	-	-	-	-	-	###	3	-

	CO Statements	POs											PSOs		
Course Code	**172TE2E09 - MATERIALS TECHNOLOGY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Analyze the behavior of the metals.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	3	-	-
CO2	Explain the mechanism and transition in steel.	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	3	-	-
CO3	Estimate the sources of failure.	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		3	-	-
CO4	Develop the knowledge of modern metallic materials.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		3	-	-
CO5	Choose non-metallic materials for different applications.	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	3	3	-
Course Code	**172TE2E10 - CONVECTIVE HEAT TRANSFER**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain principles of forced and free convection heat transfer processes.	**2**	**1**			**2**	**2**	**-**	**-**	**-**	**-**	**-**	2	2	-
CO2	Distinguish the laminar and turbulent flow convection.		**3**	**2**				**-**	**-**	**-**	**-**	**-**	-	-	1
CO3	Analyze natural convection and solve problems.		**3**	**2**				**-**	**-**	**-**	**-**	**-**	-	-	1
CO4	Solve the combined convection problems.	**3**	**2**	**1**		**3**	**3**	**-**	**-**	**-**	**-**	**-**	3	3	-
CO5	Apply the concept of convection to porous media.	**3**	**2**	**1**		**3**	**3**	**-**	**-**	**-**	**-**	**-**	3	3	-
Course Code	**172TE2E11 - THERMAL AND NUCLEAR POWER PLANTS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Calculate volumetric, gravimetric and flue gas analysis on combustion of coal	**3**	**3**		**-**	**-**		**3**	**-**	**-**	**-**	**-**	3	3	-
CO2	Explain the working of a steam power plant with subsystems.	**3**	**2**	**1**	**-**	**-**			**3**		**3**	**-**	3	2	-
CO3	Summarize the gas turbine power plant and waste heat recovery.	**3**	**2**	**1**	**-**	**-**			**3**			**-**	3	3	-
CO4	Analyze various activities and safety of nuclear power plant.	**3**	**3**	**-**	**-**	**-**		**3**		**3**		**-**	3	2	-
CO5	Distinguish economics and factors of power generation.	**3**	**3**	**-**	**-**	**-**		**2**			**3**	**-**	3	3	-
CO6	Describe instruments used for the pollution analysis.	**3**	**3**	**-**	**-**	**-**		**3**				**-**	3	3	-

	CO Statements	POs											PSOs		
Course Code	**172TE2E12 - ADVANCED AUTOMOBILE ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Compare the basics of various automobile lay-outs	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	3	-	-
CO2	Distinguish various breaking systems used in automobiles.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	3	-	-
CO3	Classify various steering mechanisms and suspension systems.	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		3	-	-
CO4	Analyze trouble shooting occurred in wiring circuits and lighting systems.	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**		3	-	-
CO5	Explain various components of hybrid vehicle.	**3**	**3**	**3**		**3**						**3**	3	3	-
Course Code	**172TE2E13 - THERMAL MEASUREMENTS AND PROCESS CONTROLS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	To discuss the types and parameters used in measuring devices.	**2**	**1**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	2	-	3
CO2	Describe the working principle of flow measuring devices.	**2**	**1**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	2	-	3
CO3	Explain the types of temperature measuring devices.			**2**	**2**		**3**	**-**	**-**	**-**	**-**	**-**	3	-	1
CO4	Classify the types of measuring devices	**3**		**2**	**2**		**3**	**-**	**-**	**-**	**-**	**-**	3	-	1
CO5	Analyze the performance of process control principles and examples.			**2**	**2**		**3**	**-**	**-**	**-**	**-**	**-**	3	-	1
Course Code	**172TE2E14 - CRYOGENIC ENGINEERING**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the various properties of fluids at low temperature and methods liquefaction systems	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	3	-	-
CO2	Analyze liquefaction systems of Neon, Nitrogen and helium	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	3	-	-
CO3	Discuss the principles of gas separation and purification systems	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	3	-	-
CO4	Interpret the significance of cryogenic refrigeration systems	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	3	-	-
CO5	Apply the knowledge of cryogenics in various fields of science	**3**	**2**	**1**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	3	-	-

	CO Statements	POs											PSOs		
Course Code	**172TE2E15 - JET PROPULSION AND ROCKETRY**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the turbojet propulsion system.		**3**	**2**				**-**	**-**	**-**		**-**	-	-	1
CO2	Summarize the principles of jet propulsion and rocketry.	**2**	**1**			**2**	**2**	**-**	**-**	**-**	**3**	**-**	2	2	-
CO3	Make use of nozzle theory.	**3**	**2**	**1**		**3**	**3**	**-**	**-**	**-**		**-**	3	3	-
CO4	Analyze the aero thermo chemistry of the combustion products.		**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**		**-**	-	-	1
CO5	Classify the liquid rocket propulsion systems.		**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**		**-**	-	-	1
CO6	Distinguish ramjet and integral rocket ramjet propulsion systems.		**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**		**-**	-	-	1
Course Code	**172TE2E16 - EQUIPMENT DESIGN FOR THERMAL SYSTEMS**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Explain the different types of heat exchangers.		**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	1
CO2	Make use of the different design methods for heat exchangers.	**3**	**2**	**1**	**-**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	3	3	-
CO3	Analyze the double pipe heat exchanger.		**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	1
CO4	Calculate the condensation of single vapours.		**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	1
CO5	Estimate the heat transfer performance in vaporizers, evaporator.		**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	1
CO6	Evaluate the performance of direct contact heat exchangers.		**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	1
Course Code	**172TE2L02 - THERMAL SYSTEMS DESIGN LAB**	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
CO1	Compare different software's available for thermal design.	**2**	**1**	**-**	**-**	**1**	**1**	**2**	**1**	**2**	**2**	**1**	2	2	-
CO2	Evaluate the thermal analysis of various thermal equipments.	**-**	**-**	**1**	**1**			**1**	**-**	**-**	**-**	**-**	-	-	2
CO3	Estimate velocity profile in case of fluid flow problems	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	2
CO4	Test thermal system design for optimization purpose.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	1
CO5	Examine the analysis procedures followed in various software's.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	-	-	-