



DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Course Code	Course Title	Semester	Branches	Conduct Periods /Week	A.Y	Date of commencement of Semester	
20ME3T04	ENGINEERING THERMODYNAMICS	III	Mechanical Engineering	6	2021-22	25 -10-2021	
COURSE OUTCOMES							
1	Apply basic principles and Zeroth law of thermodynamics to solve problems. [K3]						
2	Apply first law of thermodynamics to different thermodynamic systems. [K3]						
3	Apply second law of thermodynamics and general thermodynamic property relations to solve Problems. [K3]						
4	Describe the thermodynamic concepts of pure substances and identify their properties using Standards. [K2]						
5	Analyse various power cycles, vapour power cycles and Refrigeration cycles. [K4]						
UNIT	Out Comes/ Blooms Level	Top ics No.	Topics/Activity	Text Book /Referen ce	Cond uct Hour	Delive ry Metho d	
I	CO1: Apply basic principles and Zeroth law of thermodynamics to solve problems. [K3]	1. Introduction: Basic Concepts					Chalk, Talk, & videos
		1.1	Thermodynamic Systems, Types of Systems, Control volume.	T ₁ & T ₂	1		
		1.2	Macroscopic and Microscopic Viewpoints, Thermodynamic Equilibrium	T ₁ &T ₂	1		
		1.3	Property and Types, State, Process, Cycle	T ₁	1		
		1.4	Reversible Process, Quasi Static Process	T ₁ & R ₁	1		
		1.5	Irreversible Process, Energy in State and in Transition- Types, Work and Heat	T ₁ & R ₁	1		
		1.6	Point Function and Path Function	T ₂ & R ₂	1		
		Zeroth Law of Thermodynamics					
		1.7	Definition, Concept of Temperature	T ₁ &T ₂	1		
		1.8	Principles of Thermometry – Reference Points	T ₁ & T ₂	1		
	1.9	Constant Volume gas Thermometer	T ₁ , & R ₁	1			
1.10	Electrical Resistance Thermometer, Thermocouple, Ideal Gas Scale	T ₁	1				
C.B.S-1	1.11	Constant pressure gas thermometer	T ₁	1			
Total					11		



		2. Ideal Gas Laws:				
II	CO2: Apply first law of thermodynamics to different thermodynamic systems. [K3]	2.1	Definitions- Equation of State, Universal Gas Constant.	T_1 & T_2	1	Chalk, Talk, & videos
		2.2	Specific Heat at Constant Volume & Pressure	T_1 & R_1	1	
		2.3	Principle of First law of thermodynamics- Joule's Experiment, Internal Energy	T_1 & R_1	1	
		2.4	Enthalpy, PMM-1	T_1 & R_1	1	
		2.5	First law applied for a Non Flow Processes for constant volume and pressure process	T_1 & R_1	1	
		2.6	Isothermal process	T_1 & R_1	1	
		2.7	Adiabatic and polytropic process	T_1 & R_1	1	
		2.8	First Law Applied to a Flow System - Steady Flow Energy Equation	T_1 & R_1	1	
		2.9	SFEE Applications	T_1 & R_1	1	
		2.10	Throttling Process and Free Expansion	T_1 & R_1	1	
		2.11	problems	T_1 & R_1	2	
	C.B.S-2	2.12	Vander wall's equation of state.	T_1	1	
Total					13	
		3. Second Law of Thermodynamics				
	CO3: Apply second law of thermodynamics and general thermodynamic property relations to solve Problems. [K3]	3.1	Limitations of the 1 st Law of Thermodynamics	T_2 & R_2	1	Chalk, Talk & PPT
		3.2	Thermal Reservoir, Heat Engine, Refrigerator and Heat pump.	T_2 & R_2	1	
		3.3	Kelvin-Planck and Clausius Statements	T_1 & T_2	1	
		3.4	Equivalence Kelvin-Planck and Clausius Statements & PMM-2	T_1 & T_2	1	
		3.5	Carnot Cycle	T_1 & T_2	1	
		3.6	Carnot's theorem and its corollaries	T_1 & T_2	1	
		3.7	Thermodynamic scale of Temperature		1	
		3.8	Clausius Inequality,	T_1 & T_2	1	
		3.9	Entropy, Principle of Entropy Increase	T_1 & T_2	1	
		3.10	Availability and Irreversibility	T_1 & T_2	1	
		3.11	Thermodynamic Potentials - Gibbs and Helmholtz Functions	T_2 & R_2	1	
		3.12	Maxwell Relations	T_2 & R_2	1	
		3.13	Elementary Treatment of the 3 rd Law of TD	T_2 & R_2	1	
		3.14	problems	T_1	2	
Total					15	



		4. Properties of Pure Substances					
IV	CO4: Describe the thermodynamic concepts of pure substances and identify their properties using Standards. [K2]	4.1	Definitions- Sensible heat, Latent heat and total heat	T_1 & T_2	1	Chalk, Talk, & Tutorials	
		4.2	Phase Transformation- Formation of Steam- P-V diagram, P-T diagram	T_1 & T_2	1		
		4.3	T-S diagram and h-s diagram or Mollier Chart.	T_1 & T_2	1		
		4.4	PVT Surface, Triple point and critical point	T_2 & R_1	1		
		4.5	Dryness Fraction, Steam Calorimetry	T_1 & R_1	1		
		4.6	Property Tables	T_1 & R_1	1		
		4.7	Various Thermodynamic Processes like constant volume and pressure process	T_1 & T_2	1		
		4.8	Isothermal process	T_1 & T_2	1		
		4.9	Adiabatic and polytropic process	T_1 & T_2	1		
		4.10	problems	T_1 & T_2	2		
	C.B.S-3	4.11	Compressed Liquid	T_1 & T_2	1		
Total					12		
V	CO5: Analyse various power cycles, vapour power cycles and Refrigeration cycles. [K4]	5. Power Cycles:					Chalk, Talk, & Tutorials
		5.1	Otto Cycle - P-V diagrams & T-S diagrams Thermal Efficiency, Mean Effective Pressure	T_1 & T_2	1		
		5.2	Diesel Cycle	T_1 & T_2	1		
		5.3	Dual Combustion cycle	T_1 & T_2	1		
		5.4	Comparison of Cycles	T_1 & T_2	1		
		5.5	Problems	T_1 & T_2	3		
		Vapour Power & Refrigeration Cycles					
		5.6	Brayton Cycle - P-V diagrams & T-S diagrams- Thermal Efficiency	T_2 & R_1	1		
		5.17	Ideal Rankine Cycle - P-V diagrams & T-S diagrams - Thermal Efficiency	T_2 & R_1	1		
		5.8	Bell- Coleman Cycle - COP	T_2 & R_1	1		
	5.9	VCR Cycle -COP	T_2 & R_1	1			
5.10	Simple problems	T_2 & R_1	2				
Total					13		
Cumulative Proposed Periods					64		
Where : C.B.S = Content Beyond the Syllabus							



**SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
(AUTONOMOUS)**

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Text Books:	
S.No	Authors, Book Title, Edition, Publisher, Year of Publication
T1	P.K Nag, Engineering Thermodynamics, 6 th Edition, McGraw-Hill Publication, 2020
T2	Y.A.Cengel & M.A.Boles, Thermodynamics, 9 th Edition – McGraw-Hill Publication, 2019
Reference Books:	
S.No	Authors, Book Title, Edition, Publisher, Year of Publication
R1	R.K Rajput, A Textbook Of Engineering Thermodynamics, 5th Edition, Lakshmi Publication, 2016.
R2	P.Chattopadhyay, Engineering Thermodynamics, 2 th Edition, Oxford Higher Edn Publ, 2015
Web Details	
W1	https://youtube.com/playlist?list=PLD8E646BAB3366BC8
W2	https://sites.google.com/site/thermojan2019/
W3	https://www.researchgate.net/deref/http%3A%2F%2Fwww.thermalfluidscentral.org%2F

S.NO.	Details	Name	Signature
i.	Faculty	Mr. B SRINIVAS	
ii.	Faculty II (for common Course)	Mr. G VEERENDRA KUMAR	
iii.	Course Coordinator	Mr. B SRINIVAS	
iv.	Module Coordinator	Dr. R. LALITHA NARAYANA	
v.	Program Coordinator	Dr. A. GOPI CHAND	

Principal