



SWARNANDHRA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous)

Narsapur, West Godavari District, A.P. 534280

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Course Code	Course Title	Semester	Branches	Conduct Periods /Week	A.Y	Date of commencement of Semester
20ME5T03	THERMAL ENGINEERING	V	Mechanical Engineering	6	2024-25	05-06-2024

CO. No	COURSE OUTCOMES	Knowledge Level
CO1	Differentiate the air standard cycles and actual cycles with reference to engine performance.	K2
CO2	Illustrate the working principles of Internal combustion engines and compute their performance and efficiency.	K3
CO3	Discover and discuss the effect of engine variables on combustion phenomenon in S.I and C.I. engines	K3
CO4	Evaluate the performance of I. C. Engines.	K4
CO5	Describe the working and analyze the performance of reciprocating and rotary air compressors.	K3


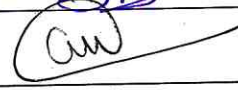

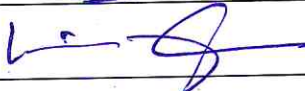

UNIT	Out Comes/ BTKL	Topic No.	Topics/Activity	Text Book / Reference	Conduct Hour	Delivery Method	
I	CO1: Differentiate the air standard cycles and actual cycles with reference to engine performance [K2]	UNIT-I (ACTUAL CYCLES AND THEIR ANALYSIS)					Chalk, Talk, & PPT
		1.1	Introduction, Comparison of Air Standard and Actual Cycles	T ₁ &T ₂	1		
		1.2	Time Loss Factor	T ₁ &T ₂	1		
		1.3	Heat Loss Factor	T ₁ &T ₂	1		
		1.4	Exhaust Blow down, Loss due to Gas exchange process	T ₁ & R ₂	1		
		1.5	Volumetric Efficiency	T ₁ &T ₂	1		
		1.6	Loss due to Rubbing Friction	T ₁ &T ₂	1		
		1.7	Actual & fuel Air Cycles of CI Engines.	T ₁ &T ₂	1		
Total					07		

		UNIT-II (I.C. ENGINES)						
II	CO2: Illustrate the working principles of Internal combustion engines and compute their performance and efficiency [K3]	2.1	Classification & Working principles of I.C. Engines – four stroke petrol engine with theoretical and actual P-V diagrams	T ₁ &T ₂ w ₂	1	Chalk, Talk, PPT, Model Based Learning, & Animation Videos		
		2.2	Four stroke Diesel engine with theoretical and actual P-V diagrams	T ₁ &T ₂ w ₂	1			
		2.3	Two stroke petrol engine & Diesel engine	T ₁ &T ₂	1			
		2.4	Comparison between two stroke and four stroke engine and petrol and diesel engines	T ₁ &T ₂	1			
		2.5	Valve & Port Timing Diagram	T ₁ &T ₂	1			
		2.6	Engine systems – Fuel system- Carburetor-types	T ₁ & R ₂	1			
		2.7	Fuel Injection	T ₁ & R ₂	1			
		2.8	Ignition system	T ₁ & R ₂	1			
		2.9	Cooling system	T ₁ & R ₂	1			
		2.10	Lubrication system	T ₁ &T ₂	1			
		2.11	Principle of Wankle engine	T ₁ &T ₂	1			
		2.12	Principles of super charging & Turbo Charging	T ₁ &T ₂	1			
				Total	12			
		UNIT-III (COMBUSTION IN S.I. ENGINES)						
III	CO3: Discover and discuss the effect of engine variables on combustion phenomenon in S.I and C.I. engines [K3]	3.1	Three stages of Combustion	T ₁ &T ₂	1	Chalk, Talk, PPT & Active Learning		
		3.2	Flame Front Propagation	T ₁ &T ₂	1			
		3.3	Factors Influencing the Flame Speed	T ₁ &T ₂	1			
		3.4	Abnormal Combustion- the phenomenon of Knock in SI Engines	T ₁ &T ₂	1			
		3.5	Knock Limited Parameter	T ₁ &T ₂	1			
		3.6	Anti-knock additives and fuel rating	T ₁ &T ₂	1			
		3.7	combustion chamber requirements, combustion chamber types	T ₁ &T ₂	1			
					COMBUSTION IN C.I. ENGINES			
		3.8	Four stages of combustion	T ₁ &T ₂	1			
		3.9	Delay period and its importance	T ₁ &T ₂	1			
		3.10	Effect of engine variables	T ₁ & R1	1			
		3.11	Diesel Knock	T ₁ & R ₂	1			
		3.12	Need for air movement, suction, compression, combustion induced turbulence	T ₁ & R1	1			
		3.13	open type & divided Type combustion chambers	T ₁ & R1	1			
		3.14	nozzles used in combustion chambers	T ₁ &T ₂	1			
3.15	fuel requirements and fuel rating	T ₁ &T ₂	1					
				Total	15			

IV	CO4: Evaluate the performance of I. C. Engines [K4]	UNIT-IV (TESTING AND PERFORMANCE)			Chalk, Talk, Experiments, PPTs & Active Learning	
		4.1	Parameters of performance - Brake power, Indicated power	T ₁ &T ₂		1
		4.2	Friction power – methods for determination	T ₁ &T ₂		1
		4.3	Engine Efficiencies	T ₁ &T ₂		1
		4.4	measurement of cylinder pressure	T ₁ &T ₂		1
		4.5	measurement of fuel consumption	T ₁ &T ₂		1
		4.6	measurement of air intake	T ₁ &T ₂		1
		4.7	exhaust gas composition	T ₁ &T ₂		1
		4.8	Performance test	T ₁ & R1		1
		4.9	Heat balance sheet and chart	T ₁ & R1		1
		4.10	Problems on performance of I.C.Engine	T ₁ & R1		1
		4.11	Problems on performance of I.C.Engine	T ₁ & R1		1
		4.12	Problems on Heat balance sheet	T ₁ & R1		1
Total				12		
V	CO5: Describe the working and analyze the performance of reciprocating and rotary air compressors [K3]	UNIT-IV (RECIPROCATING TYPE AIR-COMPRESSORS)			Chalk, Talk, Experiments, Animation Videos & Active Learning	
		5.1	Classification of Air-Compressors	T ₁ &T ₂		1
		5.2	Working Principle of Reciprocating type	T ₁ &T ₂		1
		5.3	Derivation of work required without clearance volume	T ₁ &T ₂		1
		5.4	Derivation of work required with clearance volume	T ₁ &T ₂		1
		5.5	Isothermal efficiency, volumetric efficiency, Effect of clearance	T ₁ &T ₂		1
		5.6	multi stage compression - saving of work,	T ₁ &T ₂		1
		5.7	minimum work condition for two stage compression	T ₁ &T ₂		1
		5.8	Problems without clearance	T ₁ &T ₂		1
		5.9	Problems with clearance	T ₁ &T ₂		1
		ROTARY TYPE AIR-COMPRESSORS				
		5.10	Principle of operation of Roots Blower	T ₁ &T ₂		1
		5.11	Principle of vane sealed compressor	T ₁ & R1		1
		5.12	Lysholm compressor	T ₁ & R1		1
		5.13	Centrifugal compressors	T ₁ &T ₂		1
5.14	Axial Flow Compressors	T ₁ & R1	1			
Total				14		
CUMULATIVE PROPOSED PERIODS				60		

Text Books:	
S.No	Authors, Book Title, Edition, Publisher, Year of Publication
T ₁	V. Ganesan, Internal Combustion Engines, Tata McGraw Hill, 4 th Edition, 2017
T ₂	R.K.Rajput, Thermal Engineering, Lakshmi Publications, 10 th Edition, 2018

Reference Books:	
S.No.	Authors, Book Title, Edition, Publisher, Year of Publication
R ₁	Mahesh M Rathore. Thermal Engineering-I, Tata McGraw Hill, 4 th Edition, 2018
R ₁	Rudramoorthy, Thermal Engineering, Tata McGraw-Hill Education India, 4 th Edition, 2010 Thermal Engineering,
Web Details	
W1	https://onlinecourses.nptel.ac.in/noc23_me31/preview
W2	https://www.youtube.com/watch?v=fTAUq6G9apg
W3	https://en.wikipedia.org/wiki/Internal_combustion_engine
W4	https://nptel.ac.in/courses/112103275

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 Gopichand	


Principal