



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

Seetharamapuram, NARASAPUR - Pin: 534 280

DEPARTMENT OF MECHANICAL ENGINEERING

LESSON PLAN

Course Code	Course Title	Semester	Branches	Conduct Periods /Week	A.Y	Date of commencement of Semester	
19ME5T03	THERMAL ENGINEERING	V	Mechanical Engineering	6	2021-22	01-10-2021	
COURSE OUTCOMES							
CO1	Differentiate the air standard cycles and actual cycles with reference to engine performance [K4]						
CO2	Explain the working of I. C. Engines and its components [K2]						
CO3	Distinguish and discuss the effect of engine variables on combustion phenomenon in S.I and C.I. engines. [K2]						
CO4	Evaluate the performance of I. C. Engines [K4]						
CO5	Describe the working and analyse the performance of reciprocating and rotary air compressors. [K3]						
UNIT	Out Comes/ Blooms Level	Topic s No.	Topics/Activity	Text Book /Reference	Conduct Hour	Deliv ery Meth od	
I	CO1: Differentiate the air standard cycles and actual cycles with reference to engine performance [K4]	1. ACTUAL CYCLES AND THEIR ANALYSIS					Chalk, Talk, &web
		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		
	C.B.S-1	1.8	Comparison of Air Standard & Fuel-air cycles	T ₁ &T ₂	1		
					Total	8	



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		2. I.C. ENGINES				
II	CO2: Explain the working of I. C. Engines and its compon ents [K2]	2.1	Classification & Working principles of I.C. Engines – four stroke petrol engine with theoretical and actual P-V diagrams	$T_1 \& T_2$	1	Chalk, Talk, & Videos
		2.2	Four stroke Diesel engine with theoretical and actual P-V diagrams	$T_1 \& T_2$	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 Timing Diagram	$T_1 \& T_2$	1	
		2.6	Port Timing Diagram	$T_1 \& T_2$	1	
		2.7	Engine systems – Fuel system- Carburetor- types	$T_1 \& R_2$	1	
		2.8	Fuel Injection	$T_1 \& R_2$	1	
		2.9	Ignition system	$T_1 \& R_2$	1	
		2.10	Cooling system	$T_1 \& R_2$	1	
		2.11	Lubrication system	$T_1 \& T_2$	1	
		2.12	Principle of Wankle engine	$T_1 \& T_2$	1	
		2.13	Principles of super charging & Turbo Charging	$T_1 \& T_2$	1	
	C.B.S-2	2.14	Electronic Ignition system	$T_1 \& T_2$	1	
Total					14	
		3. COMBUSTION IN S.I. ENGINES				
CO3: Distinguish and discuss the effect of engine variables on combustion phenomeno n in S.I and C.I. engines. [K2]	3.1	Three stages of Combustion	$T_1 \& T_2$	1	Chalk, Talk & PPT	
	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	$T_1 \& R_1$	1		
	3.11	Diesel Knock	$T_1 \& R_2$	1		
	3.12	Need for air movement, suction, compression, combustion induced turbulence	$T_1 \& R_1$	1		
	3.13	open type combustion chambers	$T_1 \& R_1$	1		
	3.14	divided type combustion chambers	$T_1 \& R_1$	1		
	3.15	nozzles used in combustion chambers	$T_1 \& T_2$	1		
3.16	fuel requirements and fuel rating	$T_1 \& T_2$	1			
Total					16	



		4. TESTING AND PERFORMANCE						
IV	CO4: Evaluate the performance of I. C. Engines [K4]	4.1	Parameters of performance - Brake power, Indicated power	T ₁ &T ₂	1	Chalk, Talk, & Tutorials		
		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 Heat balance sheet	T ₁ & R1	1			
	C.B.S-3	4.12	Analytical methods for performance estimation	T ₁ & R1	1			
				Total	12			
		5. AIR-COMPRESSORS (Reciprocating type)						
V	CO5: Describe the working and analyze the performance of reciprocating and rotary air compressors. [K3]	5.1	Classification of Air-Compressors	T ₁ &T ₂	1	Chalk, Talk, & videos		
		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			
		5.9	Problems	T ₁ &T ₂	1			
		Rotary type						
		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	15			
CUMULATIVE PROPOSED PERIODS					65			



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Where : C.B.S = Content Beyond the Syllabus

Text Books:

S.No	Authors, Book Title, Edition, Publisher, Year of Publication
T ₁	V. Ganesan, Internal Combustion Engines, Tata McGraw Hill, 4th Edition, 2017
T ₂	R.K.Rajput, Thermal Engineering, Lakshmi Publications, 10th 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, 4th Edition, 2018
R ₁	Rudramoorthy, Thermal Engineering, Tata McGraw-Hill Education India, 4th Edition, 2010 Thermal Engineering,

Web Details

W1	https://www.tatacapital.com/blog/vehicle-loan/what-is-bs-6-engine-technology-how-does-it-work/
W2	https://www.youtube.com/watch?v=fTAUq6G9apg
W3	https://en.wikipedia.org/wiki/Internal_combustion_engine

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