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
			UNIT-I (ACTUAL CYCLES AND THEIR ANALYSIS)			
I	CO1: Differentiate the air standard cycles and actual cycles with reference to engine performance [K2]	1.1	Introduction, Comparison of Air Standard and Actual Cycles	T_1&T_2	1	Chalk, Talk, & PPT
		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	

II	**CO2:** Illustrate the working principles of Internal combustion engines and compute their performance and efficiency [K3]	**UNIT-II (I.C. ENGINES)**				
		2.1	Classification & Working principles of I.C. Engines – four stroke petrol engine with theoretical and actual P-V diagrams	T_1&T_2 W2	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 W2	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**	
III	**CO3:** Discover and discuss the effect of engine variables on combustion phenomenon in S.I and C.I. engines [K3]	**UNIT-III (COMBUSTION IN S.I. ENGINES)**				
		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, 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://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