

**Department of Mechanical Engineering**  
**Lesson Plan**

**Name of the Subject** : THERMAL ENGINEERING – I (14BT40302)

**Class & Semester** : II B.Tech. II-Sem

**Name of the faculty Member** : Mr.R.L.Krupakaran

S. No.	Topic	No. of periods	Book(s) followed	Topics for self-study
<b>UNIT – I: I.C. ENGINES:</b>				
1	Heat engine: Basic engine components; Classification of I.C. Engines; Working of two stroke and four stroke engines;	1	T1,T2,R1	1. Engine components materials. 2. Comparison of P-V diagram of Air standard cycle and fuel air cycle for SI and CI engine. 3. Loss due to incomplete combustion, direct heat, pumping .
2	Comparison of two stroke and four stroke engines; comparison of SI and CI engines;	1	T1,T2	
3	Valve and port timing diagrams; application of I.C engines;	2	T1,T2	
4	fuel air cycles:	1	T1 & T2	
5	Composition of cylinder gases; variable specific heats, dissociation, number of moles;	2	T1,T2,R1	
6	actual cycle: heat loss, time loss, exhaust blow down factors and loss due to rubbing friction.	2	T1,T2,R1	
<b>Total periods required:</b>		<b>09</b>		
<b>UNIT – II: COMBUSTION IN S.I. AND C.I. ENGINES:</b>				
7	Normal combustion and abnormal combustion in S.I engines: flame propagation and effect of engine variables:	2	T1 ,R1,& R2	1. Effect of detonation SI engine. 2. Control of detonation in SI engine. 3. Methods of controlling diesel knock. 4. Difference between induction swirl and compression swirl. 5. Cold starting aids in CI engine
8	Stages of combustion:	1	T1 ,R1,& R2	
9	Pre-ignition and knocking;	1	T1 ,R1,& R2	
10	types of combustion chambers in S.I engines; Fuel Requirements and Fuel Rating.	1	T1 ,R1,& R2	
11	Stages of combustion in C.I Engines:	1	T1 ,R1,& R2	
12	Factor affecting delay period; phenomenon of knock in C.I engine; comparison of knock in S.I and C.I engines;	2	T1 ,R1,& R2	
13	types of combustion chambers in C.I engines; Fuel Requirements and Fuel Rating.	1	T1 ,T2,R1,& R2	
<b>Total periods required:</b>		<b>09</b>		

<b>UNIT – III: ENGINE PERFORMANCE PARAMETERS, MEASUREMENTS AND TESTING:</b>				
14	Brake power: Indicated power; Friction power; Mean effective pressure; Engine efficiencies;	2	T1, T2, R1,&R4	1. Study the performance curves.
15	Performance calculations; Heat balance.	2	T1, T2, R1,&R4	
16	Measurement of Brake power: Rope brake; hydraulic; Eddy current and swinging field DC dynamometers;	2	T1, T2, R1,&R4	
17	Measurement of Friction power: Willian’s line method;	1	T1, T2, R1,&R4	
18	Morse test; motoring test and retardation test; and simple problems	2	T1, T2, R1,&R4	
19	Air and fuel measurement and simple problems	2	T1, T2, R1,&R4	
<b>Total periods required:</b>		<b>11</b>		
<b>UNIT –IV: NON CONVENTIONAL ENGINES:</b>				
20	Working principles: CRDI engines; Dual fuel and Multifuel engines;	2	T1 ,&R1	1. Methods of charge stratification and characteristic of stratified engine. 2. Advantage and disadvantages of non conventional engines.
21	GDI engines; HCCI engines; Lean burn engines;	2	T1 ,&R1	
22	Stirling Engines; Stratified charge engines,	2	T1 ,&R1	
23	VCR engine and Wankel engines..	1	T1 ,&R1	
<b>Total periods required:</b>		<b>7</b>		
<b>UNIT –V: AIR COMPRESSORS:</b>				
24	Air Compressors: Reciprocating Compressors;	1	T1,T2,& R4	1. Work done on with clearance and without clearance for reciprocating compressor. 2. Characteristics of centrifugal compressors. 3. Surging, choking, stalling in compressor.
25	Effect of Clearance volume in Compressors; Volumetric Efficiency;	1	T1,T2,& R4	
26	Single Stage and Multi Stage Compressors;	1	T1,T2,& R4	
27	Performance test of single acting reciprocating compressor	1	T1,T2,& R4	
28	Effect of Inter cooling and Pressure Drop in Multi - Stage Compressors;	1	T1,T2,& R4	
29	Working principles of Roots blower; Vane type Blower;	1	T1,T2,& R4	
30	Centrifugal Compressor; Axial Flow Compressors.	1	T1,T2,& R4	
31	Calculation of Design parameters like temperature ,power, impeller diameter, breath, and blade angle, for centrifugal compressor	2	T1,T2,& R4	
<b>Total periods required:</b>		<b>09</b>		
<b>Grand total periods required:</b>		<b>45</b>		

**TEXT BOOKS:**

T1. V. Ganesan, *I.C. Engines*, TMH, 3<sup>rd</sup> Edition, 2008.

T2. R.K.Rajput, *Thermal engineering*, Lakshmi publications, 8<sup>th</sup> Edition, 2010

**REFERENCE BOOKS:**

R1. M.L Mathur & R.P.Sharma, *Internal combustion engines*, Dhanpat Rai & Sons, 8<sup>th</sup> Edition, 2014.

R2. Heywood, *I.C. Engines*, McGrawHill. 1<sup>st</sup> Edition, 2013.

R3 Pulkrabek, *Engineering fundamentals of IC Engines*, Pearson, 2<sup>nd</sup> Edition, 2004.

R4 R.S.Khurmi & J.K. Guptha, *Thermal Engineering*, S.Chand , 16<sup>th</sup> Edition, 2008.