



Department of Mechanical Engineering
Raajdhani Engineering College, Bhubaneswar, Odisha-751017

LESSON PLAN

Faculty Name	Ayushman Nayak			Name of the Program	Diploma in Mechanical Engineering
Course Name	Thermal Engineering (II)			Course Code	TH-4 / (C 212)
Course Year	2nd year	Semester	4TH	Academic Period	2023-24
No. of Classes allotted per Week	04	Planned Classes Required to Complete the Course			60

Sl. No.	Topics to be covered	Module	No. of hours Required	Mode of Teaching	CO	BOOK	CHAPTER (PAGES)	OTHER SOURCE(IM)
1	Revision the basic of I.C Engine and it's working.	I	1	LM/ IM	CO1	T1 T2	T1 : 1–15 T2 :-	https://www.youtube.com/watch?v=aaopC0Dftbo&list=PLgwJf8NK-2e6LLgDinREtD9GMNXJs2WYI
2	Explain Indicated power, Brake Power and frictional power of an I.C engine.	I	1	LM/ IM	CO1	T1 T2	T1 : 1–15 T2 :-	https://www.youtube.com/watch?v=Tpzu1igNuvo&pp=ygVKRXhwbGFpbiBJbmR pY2F0ZWQgcG93ZXIsIEJyYWtlIFBvd2 VyIGFuZCBmcmlljdGlvbmFsIHBvd2VyI G9mIGFuIEkuQyBlbmdpbmU%3D
3	Define Mechanical, Indicated thermal and Relative efficiencies of an I.C engine.	I	1	LM/ IM	CO1	T1 T2	T1 : 16–52	https://www.youtube.com/watch?v=uLqdB121Rk0&pp=ygVQRGVmaW51IE11Y2h hbmljYWwsIEluZGljYXRlZCB0aGVy bWFsIGFuZCBSZWxhdG12ZSBIZmZpY2 llbmNpZXMgb2YgYW4gSS5DIGVuZ2l uZS4%3D
4	Define Break thermal efficiency, Volumetric efficiency and Overall efficiency of I.C engine.	I	1	LM/ IM	CO1	T1	T1 : 16–52 T2 :-	https://www.youtube.com/watch?v=6mhVjk_aj6c&pp=ygVcRGVmaW51IEJyZW FrIHRoZXJtYWwgZWZmaWNpZW5jeS



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						T2		wgVm9sdW1ldHJpYyBIZmZpY2llbmN5IGFuZCBPdmVyYWxsIGVmZmljaWVuY3kgb2YgSS5DIGVuZ2luZS4%3D
5	Define Mean effective pressure, Specific fuel consumption and Air-fuel ratio for an I.C engine.	I	1	LM/ IM	CO1	T1 T2	T1 : 87–119 T2 :-	https://www.youtube.com/watch?v=Mme12Mi2xE&pp=ygVfRGVmaW5lIE1lYW4gZWZmZWN0aXZlIHByZXNzdXJlCBTcGVjaWZpYyBmdWVsIGNvbnN1bXB0aW9uIGFuZCBBaXItZnVlbCBYXXRpbYBmb3IgYW4gSS5DIGVuZ2luZS4%3D
6	Review class	I	1	LM/ IM	CO1	T1 T2	T1 : 87–119 T2 :-	
7	Numerical	I	1	LM/ IM	CO1	T1 T2	T1 : 120–180	
8	Numerical	I	1	LM/ IM	CO1	T1 T2	T1 : 1–15	
9	Define Compressor; explain its function, types and industrial use of compressed air.	II	1	LM/ IM	CO1	T1 T2	T1 : 1–15	https://www.youtube.com/watch?v=vBMHlgPtGcg&pp=ygVURGVmaW5lIE1lYXByZXNzb3I7IGV4cGxhaW4gaXRzIGZlbnN0aW9uLCB0eXBlcYBhbmQgaW5kdXN0cmllhbCB1c2Ugb2YgY29tcHJlc3NlZCBhaXlu
10	Classify Compressor and principle of operation.	II	1	LM/ IM	CO1	T1 T2	T1 : 1–180	https://www.youtube.com/watch?v=ZK3A9ktXbGE&pp=ygUvQ2xhc3NpZnkgQ29tcHJlc3NvcjBhbmQgcHJpbmNpcGxIG9mIG9wZXJhdGlvb4%3D



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18	Review class	II	1	LM/ IM	CO2	T1 T2	T1 : 281–340 T2 :-38-76	
19	Numerical	II	1	LM/ IM	CO2	T1 T2	T1 : 281–340	
20	Numerical	II	1	LM/ IM	CO2	T1 T2	T1 : 281–340	
21	Explain the formation of steam and differentiate between gas and vapours.	III	1	LM/ IM	CO2	T1 T2	T1 : 281–340	https://www.youtube.com/watch?v=1f9Hwr4yVG4&pp=ygVJRjXhwbGFpbiB0aGUgZm9ybWFOaW9uIG9mIHN0ZWFiIGFuZCBkaWZmZXJlbnRpYXRiIGJldHdlZW4gZ2FzIGFuZCB2YXBvdXJzLg%3D%3D
22	Define pure substance and its phases and explain the phase change phenomena of a pure substance.	III	1	LM/ IM	CO3	T1 T2	T1 : 281–340	https://www.youtube.com/watch?v=Ef5IzdpLmio&pp=ygVgRGVmaW5lIHBlcmUgc3Vic3RhbmNIIGFuZCBpdHMgcGhhc2VzIGFuZCBleHBsYWluIHRoZSBwaGFzZSBjaGFuZ2UgcGhlbm9tZW5hIG9mIGEgcHVyZSBzdWJzdGFuY2Uu
23	State and Explain the Terminology of a pure substance.	III	1	LM/ IM	CO3	T1 T2	T1 : 281–340	https://www.youtube.com/watch?v=TR2iR3CZLcw&pp=ygU2U3RhdGUgYW5kIEV4cGxhaW4gdGhIFRlcm1pbm9sb2d5IG9mIGEgcHVyZSBzdWJzdGFuY2Uu
24	Explain the property diagram i.e. P-V, T-V and P-V-T diagram	III	1	LM/ IM	CO3	T1 T2	T1 : 281–340	https://www.youtube.com/watch?v=yxDRlUuUDcE&pp=ygU8RXhwbGFpbiB0aGUgcHJvcGVydHkgZGhZ3JhbSBpLmUuIFAtViwgVC1WIGFuZCBQLVYtVCBkaWFncmFt
25	Explain Critical point, Triple point and T-S and h-S diagram.	III	1	LM/ IM	CO3	T1 T2	T1 : 509–557 T2 :-38-76	https://www.youtube.com/watch?v=50-qMlkTpW0&pp=ygU8RXhwbGFpbiBDcm10aWNhbCBwb2ludCwgVHJpcGxlIHByaW50IGFuZCBULVMgYW5kIGgtUyB



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26	Explain the Steam table and Mollier chart for finding the unknown properties.	III	1	LM/ IM	CO3	T1 T2	T1 : 509–557	https://www.youtube.com/watch?v=CU28a-5Ker8&pp=ygVNRXhwbGFpbiB0aGUgU3RlYW0gdGFibGUgYW5kIE1vbGxpZXIgaY2hhcnQgZm9yIGZpbmRpbmcgdGhIIHVua25vd24gcHJvcGVydGllcy4%3D
27	Explain the Enthalpy change during the formation of steam.	III	1	LM/ IM	CO3	T1 T2	T1 : 509–557	https://www.youtube.com/watch?v=rzKxt1_GfnI&pp=ygU6RXhwbGFpbiB0aGUgRW50aGFscHkgY2hhbmdlIGRlcmluZyB0aGUgZm9ybWF0aW9uIG9mIHN0ZWFlLg%3D%3D
28	Explain the latent heat, Sensible heat, latent heat of fusion and Enthalpy of Vaporization.	III	1	LM/ IM	CO3	T1 T2	T1 : 509–557 T2 :-38-76	https://www.youtube.com/watch?v=dxtz2POUTJE&pp=ygVbRXhwbGFpbiB0aGUgbGF0ZW50IGhlYXQsIFNlbnNpYmxlIGhlYXQsIGxhdGVudCB0ZWZ0IG9mIGZlc2lubiBhbmQgRW50aGFscHkgb2YgVmFwb3JpemF0aW9uLg%3D%3D
29	Explain the wet steam, dry steam and superheated steam and advantage of superheating the steam.	III	1	LM/ IM	CO3	T1 T2	T1 : 509–557	https://www.youtube.com/watch?v=MvqAdYTKrZw&pp=ygVfRXhwbGFpbiB0aGUgd2V0IHN0ZWZ0LCBkcncgc3RlYW0gYW5kIHNlcGVyaGVhdGVkIHN0ZWFlIGFuZCBhZHhbnRhZ2Ugb2Ygc3VwZXJ0ZWZ0aW5nIHRoZSBzdGVhbS4%3D
30	Review class	III	1	LM/ IM	CO3	T1 T2	T1 : 470–508 T2 :-38-76	
31	Numerical	III	1	LM/ IM	CO4	T1 T2	T1 : 470–508 T2 :-38-76	



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32	Assignment Evaluation & Class Test		1	LM/ IM	CO4	T1 T2	T1 : 470-508	
33	Define Boiler and classification of boiler.	IV	1	LM/ IM	CO4	T1 T2	T1 : 470-508	https://www.youtube.com/watch?v=4KqTiHMbAQM&pp=ygUrRGVmaW5lIEJvaWxlciBhbmQgY2xhc3NpZmljYXRpb24gb2YgYm9pbGVyLg%3D%3D
34	Explain principal part and their function of a boiler.	IV	1	LM/ IM	CO4	T1 T2	T1 : 470-508 T2 :-38-76	https://www.youtube.com/watch?v=-NuhDzM8xeU&pp=ygU2RXhwbGFpbiBwcmluY2lwYWwgGFydCBhbmQgdGhlaXIgZnVuY3Rpb24gb2YgYSBib2lsZXIu
35	Define characteristic of a good boiler and factor affecting the selection of boiler.	IV	1	LM/ IM	CO4	T1 T2	T1 : 470-508	https://www.youtube.com/watch?v=4KqTiHMbAQM&pp=ygVURGVmaW5lIGNoYXJhY3RlcmldGlljG9mIGeGZ29vZCBib2lsZXIgaW5kIGZhY3RvciBhZmZlY3RpbmcgdGhIIHNlbGVjdGlviBvZiBib2lsZXIu
36	Explain the comparison between fire and water tube boiler.	IV	1	LM/ IM	CO4	T1 T2	T1 : 470-508	https://www.youtube.com/watch?v=RR8XnoGejXM&pp=ygU6RXhwbGFpbiB0aGUgY29tcGFyaXNvbiBiZXR3ZWVuIGZpcmUgYW5kIHdhdGVyIHR1YmUgYm9pbGVyLg%3D%3D
37	Description and working of Cochran boiler.	IV	1	LM/ IM	CO4	T1 T2	T1 : 470-508 T2 :-38-76	https://www.youtube.com/watch?v=AMBbx1AXd2A&pp=ygUqRGVzY3JpcHRpb24gYW5kIHdvcmtpbmcgb2YgQ29jaHJhbiBib2lsZXIu
38	Description and working of Lancashire boiler.	IV	1	LM/ IM	CO4	T1 T2	T1 : 470-508 T2 :-38-76	https://www.youtube.com/watch?v=xMAymzTl2gQ&pp=ygUtRGVzY3JpcHRpb24gYW5kIHdvcmtpbmcgb2YgTGFuY2FzaGlyZSBib2lsZXIu
39	Description and working of Babcock and Wilcox boiler.	IV	1	LM/ IM	CO5	T1 T2	T1 : 470-508 T2 :-38-76	https://www.youtube.com/watch?v=fc8AKkEDFhc&pp=ygU1RGVzY3JpcHRpb24gYW5kIHdvcmtpbmcgb2YgQmFiY29jaYBhbmQgV2lsY294IGJvaWxlci4%3D



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40	Explain the classification and function of a boiler draught'	IV	1	LM/ IM	CO5	T1 T2	T1 : 470–508	https://www.youtube.com/watch?v=b-3fx81R9Hc&pp=ygU-RXhwbGFpbiB0aGUgY2xhc3NpZmljYXRpb24gYW5kIGZ1bmN0aW9uIG9mIGEGYm9pbGVyIGRyYXVnaHTigJk%3D
41	Describe the function of Forced, Induced draught and Balanced draught.	IV	1	LM/ IM	CO5	T1 T2	T1 : 470–508	https://www.youtube.com/watch?v=EKS7kMfmHB0&pp=ygVGRGVzY3JpYmUgdGhlIGZ1bmN0aW9uIG9mIEZvcmlhZCwgSW5kdWNIZCBkcmF1Z2h0IGFuZCBYWXhbmNIZCBkcmF1Z2h0Lg%3D%3D
42	Explain about Boiler Mountings and Accessories.	IV	1	LM/ IM	CO5	T1 T2	T1 : 470–508	https://www.youtube.com/watch?v=w5LlEmsuWLE&pp=ygUvRXhwbGFpbiBhYm91dCBCb2lsZXIgtW91bnRpbmdzIGFuZCBBY2Nlc3Nvcmlcy4%3D
43	Review class	IV	1	LM/ IM	CO5	T1 T2	T1 : 470–508	
44	Numerical	IV	1	LM/ IM	CO5	T1 T2	T1 : 470–508	
45	Define Vapor power cycle and explain performance parameters of vapor power cycle.	V	1	LM/ IM	CO5	T1 T2	T1 : 470–508	https://www.youtube.com/watch?v=96QDuDqOjzE&pp=ygVRRGVmaW51IFZhcG9yIHBvd2VyIGN5Y2x1IGFuZCBleHBsYWluIHB1cmZvcmlhbmNIIHBhcmFtZXRIcnMgb2YgdmFwb3IgcG93ZXIgtY3ljbGUu
46	Explain Carnot vapor power cycle, Derive the work and efficiency of the cycle.	V	1	LM/ IM	CO5	T1 T2	T1 : 470–508	https://www.youtube.com/watch?v=e294fJK5MIM&pp=ygVORXhwbGFpbiBDYXJub3QgdmFwb3IgcG93ZXIgtY3ljbGUsIERlcm12ZSB0aGUgd29yayBhbmQgZWZmaWNpZW5jeSBvZiB0aGUgY3ljbGUs



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47	Explain principal component and their function of vapour power plant.	V	1	LM/ IM	CO6	T1 T2	T1 : 470–508	https://www.youtube.com/watch?v=A0q2JGDnWBk&pp=ygVFRXhwbGFpbiBwcmY2lwYWwgY29tcG9uZW50IGFuZCB0aGVpciBmdW5jdGlviBvZiB2YXBvdXIgcG93ZXIgcGxhbnQu
48	Define Rankine cycle with P-V, T-S, and h-s diagram	V	1	LM/ IM	CO6	T1 T2	T1 : 470–508	https://www.youtube.com/watch?v=O3Hww4MnkIE&pp=ygUzRGVmaW5lIFJhbmtpbmUgY3ljbGUgd2l0aCBQLVYsIFQtUywgYW5kIGtscyBkaWFncmFt
49	Derive the work done and efficiency of Rankine cycle	V	1	LM/ IM	CO6	T1 T2	T1 : 820–884 T2 :-38-76	https://www.youtube.com/watch?v=xKSm-f85SH8&pp=ygU0RGVyaXZlIHRob2ZSB3b3JrIGRvbmUgYW5kIGVmZmljaWVvY3kgb2YgUmFua2luZSBjeWNsZQ%3D%3D
50	Describe the effect of various end condition in Rankine cycle	V	1	LM/ IM		T1 T2	T1 : 820–884 T2 :-38-76	https://www.youtube.com/watch?v=fpn1zBQGUwk&pp=ygU9RGVzY3JpYmUgdGhlIGVmZmVjdCBvZiB2YXJpb3VzIGVuZCBjb25kaXRpb24gaW4gUmFua2luZSBjeWNsZQ%3D%3D
51	Explain Reheat cycle and Regenerative cycle.	V	1	LM/ IM		T1 T2	T1 : 820–884 T2 :-38-76	https://www.youtube.com/watch?v=sZlchIqsvjY&pp=ygUsRXhwbGFpbiBSZWhlYXQgY3ljbGUgYW5kIFJlZ2VuZXJhdGIl2ZSBjeWNsZS4%3D
52	Numerical	V	1	LM/ IM		T1 T2	T1 : 820–884 T2 :-38-76	
53	Define the modes of heat transfer i.e. Conduction, convection and Radiation.	VI	1	LM/ IM		T1 T2	T1 : 820–884 T2 :-38-76	https://www.youtube.com/watch?v=FTSBtx5jhaY&pp=ygVMRGVmaW5lIHRob2ZSB3b3JrIGRvbmUgYW5kIGVmZmljaWVvY3kgb2YgUmFua2luZSBjeWNsZQ%3D%3D



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54	Explain Fourier's law of heat conduction and thermal conductivity.	VI	1	LM/ IM		T1 T2	T1 : 820-884 T2 :-38-76	https://www.youtube.com/watch?v=m7PvME2UzSY&pp=ygVERXhwbGFpbiBGB3VyaWVy4oCZcyBsYXcgb2YgaGVhdCBjb25kdWN0aW9uIGFuZCB0aGVybWFiIGNvbml0eS4%3D
55	Explain Newton's law of cooling Stefan Boltzmann's law and Kirchhoff's law.	VI	1	LM/ IM		T1 T2	T1 : 820-884	https://www.youtube.com/watch?v=9FnyDK9xQjE&pp=ygVRRXhwbGFpbiBOZXd0b27igJlZlGxhdyBvZiBjb29saW5nIFN0ZWZhbiBCb2x0em1hbm7igJlZlGxhdyBhbmQgS2lyY2hob2Zm4oCZcyBsYXcu
56	Explain black body radiation and emissive power of a blackbody and grey body.	VI	1	LM/ IM		T1 T2	T1 : 820-884	https://www.youtube.com/watch?v=EWqzg0iqNtw&pp=ygVORXhwbGFpbiBibGFjayBib2R5IHJhZGlhdGlviBhbmQgZW1pc3NpdmUgcG93ZXIgb2YgYSBibGFjayBib2R5IGFuZCBncmV5IGJvZHku
57	Define Emissivity, Absorptivity and Reflectivity.	VI	1	LM/ IM		T1 T2	T1 : 820-884	https://www.youtube.com/watch?v=zWFEJd390IQ&pp=ygUxRGVmaW5lIEVtaXNzaXZpdHksIEFic29ycHRpdml0eSBhbmlQgUmVmbGVjdGl2aXR5Lg%3D%3D
58	Assignment Evaluation & Class Test	VI	1	LM/ IM				
59	Discussion on Previous year question paper		1	LM/ IM				
60	Discussion on Previous year question paper		1	LM/ IM				



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LM: Learner Mode: Chalk & Talk, Lecture

IM: Interactive Mode: PPT, VIDEO and Animation

Learning resources:

- T1: R.S. Khurmi Thermal Engineering S.Chand
- T2: P.K.Nag Engineering Thermodynamics TMH
- T3: A.S. Sarao Thermal Engineering Satya Prakash
- T4: A.R.Basu Thermal Engineering Dhanpat Rai
- T5: Mahesh M Rathore Thermal Engineering TMH

R1:

R2:

Suggested link from NPTEL video/Suggested web reading:

Signature of the Faculty

Signature of the HOD