

**GOVERNMENT POLYTECHNIC, NUAPADA**

**Academic Lesson Plan for Winter semester- 2024-25**

Name of the teaching faculty: Er.Siddhant Singh Babu

Department: Mechanical Engineering

Semester: 3rd

Subject: Thermal Engg-1

No. of periods per week: 4

Total Periods: 60

End semester exam: 80

Class test: 20

Total Marks : 100

Sl. No.	Week	Period	Topic to be covered
1.	1 <sup>st</sup>	1 <sup>st</sup>	Thermodynamic Systems (closed, open, isolated)
2.		2 <sup>nd</sup>	Thermodynamic properties of a system (pressure, volume, temperature)
3.		3 <sup>rd</sup>	entropy, enthalpy, Internal energy and units of measurement).
4.		4 <sup>th</sup>	Intensive and extensive properties Define thermodynamic processes, path, cycle, state, path function, point function.
5.	2 <sup>nd</sup>	1 <sup>st</sup>	Thermodynamic Equilibrium. Quasi-static Process
6.		2 <sup>nd</sup>	Conceptual explanation of energy and its sources
7.		3 <sup>rd</sup>	Work, heat and comparison between the two. Mechanical Equivalent of Heat.
8.		4 <sup>th</sup>	Work transfer, Displacement work
9.	3 <sup>rd</sup>	1 <sup>st</sup>	State & explain Zeroth law of thermodynamics.
10.		2 <sup>nd</sup>	State & explain First law of thermodynamics. Limitations of First law of thermodynamics
11.		3 <sup>rd</sup>	Application of 1 <sup>st</sup> law of thermodynamics equation and its application to turbine and compressor)
12.		4 <sup>th</sup>	Second law of thermodynamics (Clausius & Kelvin Planck statements).
13.	4 <sup>th</sup>	1 <sup>st</sup>	Application of second law in heat engine, heat pump, refrigerator & determination of efficiencies & C.O.P
14.		2 <sup>nd</sup>	solve simple numerical
15.		3 <sup>rd</sup>	Laws of perfect gas, Boyle's law, Charle's law, Avogadro's law,
16.		4 <sup>th</sup>	Dalton's law of partial pressure, Gay lussac Law
17.	5 <sup>th</sup>	1 <sup>st</sup>	General gas equation, characteristic gas constant, Universal gas constant.
18.		2 <sup>nd</sup>	Explain specific heat of gas (Cp and Cv) Relation between Cp & Cv.
19.		3 <sup>rd</sup>	Enthalpy of a gas. Work done during a non- flow process.
20.		4 <sup>th</sup>	Application of first law of thermodynamics to various non flow process (Isothermal, Isobaric, Isentropic and polytrophic process)
21.	6 <sup>th</sup>	1 <sup>st</sup>	Solve simple problems on above.
22.		2 <sup>nd</sup>	Free expansion & throttling process.

23.		3 <sup>rd</sup>	Explain & classify I.C engine.
24.		4 <sup>th</sup>	Terminology of I.C Engine such as bore, dead centers, stroke volume and piston speed
25.	7 <sup>th</sup>	1 <sup>st</sup>	Explain the working principle of 2-stroke engines
26.		2 <sup>nd</sup>	Explain the working principle of 4- stroke engine S.I engine
27.		3 <sup>rd</sup>	Explain the working principle of 2-stroke & 4- stroke engine C.I engine.
28.		4 <sup>th</sup>	Differentiate between 2-stroke & 4stroke engine C.I engine
29.	8 <sup>th</sup>	1 <sup>st</sup>	Differentiate between 2-stroke & 4-stroke engine C.I engine
30.		2 <sup>nd</sup>	Study of valve timing diagram
31.		3 <sup>rd</sup>	What is thermodynamic cycle
32.		4 <sup>th</sup>	Carnot cycle
33.	9 <sup>th</sup>	1 <sup>st</sup>	p-v diagram with process.
34.		2 <sup>nd</sup>	. Solve simple numerical
35.	10 <sup>th</sup>	3 <sup>rd</sup>	Otto cycle.
36.		4 <sup>th</sup>	p-v diagram with process
37.		1 <sup>st</sup>	. Solve simple numerical
38.	10 <sup>th</sup>	2 <sup>nd</sup>	Diesel cycle
39.		3 <sup>rd</sup>	p-v diagram with process
40.		4 <sup>th</sup>	. Solve simple numerical
41.		11 <sup>th</sup>	1 <sup>st</sup>
42.	2 <sup>nd</sup>		p-v diagram with process
43.	3 <sup>rd</sup>		. Solve simple numerical
44.	4 <sup>th</sup>		Efficiency comparison between all
45.	12 <sup>th</sup>	1 <sup>st</sup>	Comparison between all cycles
46.		2 <sup>nd</sup>	Define Fuel. Types of fuel
47.		3 <sup>rd</sup>	Application of different types of fuel.
48.		4 <sup>th</sup>	Solid and liquid fuels
49.	13 <sup>th</sup>	1 <sup>st</sup>	Gaseous fuels
50.		2 <sup>nd</sup>	Heating values of fuel
51.		3 <sup>rd</sup>	Quality of I.C engine fuels
52.		4 <sup>th</sup>	Octane number and cetane number rating
53.	14 <sup>th</sup>	1 <sup>st</sup>	Cetane number
54.		2 <sup>nd</sup>	Previous years paper discussion
55.		3 <sup>rd</sup>	Previous years paper discussion
56.		4 <sup>th</sup>	Previous years paper discussion
57.	15 <sup>th</sup>	1 <sup>st</sup>	Revision
58.		2 <sup>nd</sup>	Revision
59.		3 <sup>rd</sup>	Revision
60.		4 <sup>th</sup>	Revision

The lesson plan prepared by the concerned Faculty

*Siddhant Singh Babu*

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GF, MECHANICAL DEPARTMENT

**GOVERNMENT POLYTECHNIC, NUAPADA**  
**Academic Lesson Plan for Winter semester- 2024-25**

Name of the teaching faculty: Er. Sidhant Singh Babu

Department: Mechanical Engineering

Semester: 5th

Subject: Hydraulic Machine & industrial fluid power

No. of periods per week: 4

Total Periods: 60

End semester exam: 80

Class test: 20

Total Marks: 100

Sl. No.	Week	Period	Topic to be covered
1.	1 <sup>st</sup>	1 <sup>st</sup>	Definition and classification of turbines
2.		2 <sup>nd</sup>	Impulse turbine with parts involved
3.		3 <sup>rd</sup>	Working of impulse turbine-Pelton wheel turbine
4.		4 <sup>th</sup>	Velocity diagram, working principle
5.	2 <sup>nd</sup>	1 <sup>st</sup>	Derivation of work done and efficiency
6.		2 <sup>nd</sup>	Solved problems on pelton wheel turbine
7.		3 <sup>rd</sup>	Study of reaction turbines-fransis turbine
8.		4 <sup>th</sup>	Working of fransis turbine with parts
9.	3 <sup>rd</sup>	1 <sup>st</sup>	Velocity diagram, working principle
10.		2 <sup>nd</sup>	Derivation of work done and efficiency
11.		3 <sup>rd</sup>	Solved problems on fransis turbine
12.		4 <sup>th</sup>	Study of reaction turbines-kaplan turbine
13.	4 <sup>th</sup>	1 <sup>st</sup>	kaplan turbine with parts involved
14.		2 <sup>nd</sup>	Working of turbine-kaplan turbine
15.		3 <sup>rd</sup>	Velocity diagram, working principle
16.		4 <sup>th</sup>	Derivation of work done and efficiency
17.	5 <sup>th</sup>	1 <sup>st</sup>	Solved problems on kaplan turbine
18.		2 <sup>nd</sup>	Comparison between impulse vs reaction turbine
19.		3 <sup>rd</sup>	All the efficiencies involved in turbines
20.		4 <sup>th</sup>	Semester based question solved
21.	6 <sup>th</sup>	1 <sup>st</sup>	Definition of pumps, classification of pumps
22.		2 <sup>nd</sup>	Centrifugal pumps working principle
23.		3 <sup>rd</sup>	Different types of head used
24.		4 <sup>th</sup>	Parts involved in centrifugal pump
25.	7 <sup>th</sup>	1 <sup>st</sup>	Derivation of work done and efficiency
26.		2 <sup>nd</sup>	Solved problems on pumps
27.		3 <sup>rd</sup>	Reciprocating pumps ,head used in it
28.		4 <sup>th</sup>	Working of single acting reciprocating pump
29.	8 <sup>th</sup>	1 <sup>st</sup>	Derivation of power required
30.		2 <sup>nd</sup>	Solved problems on pumps
31.		3 <sup>rd</sup>	Working of double acting reciprocating pump
32.		4 <sup>th</sup>	Derivation of power required
33.	9 <sup>th</sup>	1 <sup>st</sup>	Solved problems on pumps
34.		2 <sup>nd</sup>	Concept of slip,negative slip
35.		3 <sup>rd</sup>	Relationship between slip and discharge
36.		4 <sup>th</sup>	Hydraulic system,its merit and demerits
37.	10 <sup>th</sup>	1 <sup>st</sup>	Pressure control valves ,its types
38.		2 <sup>nd</sup>	Pressure relief valves, its types
39.		3 <sup>rd</sup>	Pressure regulation valves and its types
40.		4 <sup>th</sup>	Direction control valves and its types
41.	11 <sup>th</sup>	1 <sup>st</sup>	Flow control valves ,throttle valves
42.		2 <sup>nd</sup>	Fluid power pumps,vane pump

43.		3 <sup>rd</sup>	External and internal gear pumps
44.		4 <sup>th</sup>	ISO symbols of hydraulic components
45.	12 <sup>th</sup>	1 <sup>st</sup>	Actuator and its types
46.		2 <sup>nd</sup>	Direct operation of single acting cylinder
47.		3 <sup>rd</sup>	Direct operation of double acting cylinder
48.		4 <sup>th</sup>	pneumatic system, its merit and demerits
49.	13 <sup>th</sup>	1 <sup>st</sup>	Pressure control valves, its types
50.		2 <sup>nd</sup>	Pressure relief valves, its types
51.		3 <sup>rd</sup>	Pressure regulation valves and its types
52.		4 <sup>th</sup>	Direction control valves and its types
53.	14 <sup>th</sup>	1 <sup>st</sup>	Flow control valves, throttle valves
54.		2 <sup>nd</sup>	3/2 DCV, 5/2 DCV
55.		3 <sup>rd</sup>	Lubrication unit
56.		4 <sup>th</sup>	ISO symbols of pneumatic components
57.	15 <sup>th</sup>	1 <sup>st</sup>	Actuator and its types
58.		2 <sup>nd</sup>	Direct operation of single acting cylinder
59.		3 <sup>rd</sup>	Direct operation of double acting cylinder
60.		4 <sup>th</sup>	Comparison between both system

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**Academic Lesson Plan for Winter semester- 2024-25**

Name of the teaching faculty: Er Siddhant Singh Babu

Department: Electrical Engineering

Semester: 3rd

Subject: Elements of Mechanical Engg.

No. of periods per week: 4

Total Periods: 60

End semester exam: 80

Class test: 20

Total Marks : 100

Sl. No.	Week	Period	Topic to be covered
1.	1 <sup>st</sup>	1 <sup>st</sup>	State Unit of Heat and work, 1st law of thermodynamics
2.		2 <sup>nd</sup>	Point and path function, properties
3.		3 <sup>rd</sup>	State Laws of perfect gases
4.		4 <sup>th</sup>	perfect gases equation
5.	2 <sup>nd</sup>	1 <sup>st</sup>	Determine relationship of specific heat of gases at constant volume and constant pressure
6.		2 <sup>nd</sup>	Do
7.		3 <sup>rd</sup>	Use steam table for solution of simple problem
8.		4 <sup>th</sup>	simple problem part-2
9.	3 <sup>rd</sup>	1 <sup>st</sup>	Do
10.		2 <sup>nd</sup>	Explain total heat of wet, dry and super heated steam
11.		3 <sup>rd</sup>	Do
12.		4 <sup>th</sup>	State types of Boilers
13.	4 <sup>th</sup>	1 <sup>st</sup>	Do
14.		2 <sup>nd</sup>	Working of different parts
15.		3 <sup>rd</sup>	Describe Cochran boiler
16.		4 <sup>th</sup>	Describe Babcock Wilcox boiler
17.	5 <sup>th</sup>	1 <sup>st</sup>	Do
18.		2 <sup>nd</sup>	Describe Mountings of boiler
19.		3 <sup>rd</sup>	Do
20.		4 <sup>th</sup>	Describe accessories of boiler
21.	6 <sup>th</sup>	1 <sup>st</sup>	Do
22.		2 <sup>nd</sup>	Explain the principle of Simple steam engine
23.		3 <sup>rd</sup>	Draw Indicator diagram
24.		4 <sup>th</sup>	Working principle
25.	7 <sup>th</sup>	1 <sup>st</sup>	Do
26.		2 <sup>nd</sup>	Calculate Mean effective pressure,
27.		3 <sup>rd</sup>	IHP and BHP and mechanical efficiency
28.		4 <sup>th</sup>	With back pressure
29.	8 <sup>th</sup>	1 <sup>st</sup>	Without back pressure
30.		2 <sup>nd</sup>	Solve Simple problem
31.		3 <sup>rd</sup>	Do
32.		4 <sup>th</sup>	STEAM TURBINES Types
33.	9 <sup>th</sup>	1 <sup>st</sup>	Working principle
34.		2 <sup>nd</sup>	Do
35.		3 <sup>rd</sup>	Differentiate between impulse and reaction Turbine
36.		4 <sup>th</sup>	Do
37.	10 <sup>th</sup>	1 <sup>st</sup>	Detail diagram and power generation
38.		2 <sup>nd</sup>	Explain the function of condenser
39.		3 <sup>rd</sup>	State their types
40.		4 <sup>th</sup>	Air cooled condenser
41.	11 <sup>th</sup>	1 <sup>st</sup>	Water cooled condenser
42.		2 <sup>nd</sup>	Explain working of two stroke petrol and Diesel engines.
43.		3 <sup>rd</sup>	Explain working of 4 stroke petrol and Diesel engines
44.		4 <sup>th</sup>	Differentiate between them

45.	12 <sup>th</sup>	1 <sup>st</sup>	Do
46.		2 <sup>nd</sup>	Describe properties of fluid
47.		3 <sup>rd</sup>	Determine pressure at a point, pressure measuring Instruments
48.		4 <sup>th</sup>	Pressure gauge working
49.	13 <sup>th</sup>	1 <sup>st</sup>	Manometers
50.		2 <sup>nd</sup>	Types of manometer
51.		3 <sup>rd</sup>	Deduce equation of continuity of flow
52.		4 <sup>th</sup>	Solved problems
53.	14 <sup>th</sup>	1 <sup>st</sup>	Explain energy of flowing liquid
54.		2 <sup>nd</sup>	Do
55.		3 <sup>rd</sup>	State and explain Bernoulli's theorem
56.		4 <sup>th</sup>	Intensifier
57.	15 <sup>th</sup>	1 <sup>st</sup>	Hydraulic lift
58.		2 <sup>nd</sup>	Accumulator
59.		3 <sup>rd</sup>	Hydraulic ram
60.		4 <sup>th</sup>	Revision

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Name of the teaching faculty: Er. Siddhant Singh Babu

Department: Mechanical Engineering

Semester: 3rd

Subject: Mechanical Engineering Drawing

No. of periods per week: 6

Total Periods: 90

End semester exam: 50

Sessional: 25 Total Marks: 75

Sl. No	Week	Period	Topic to be covered
1	1 <sup>st</sup>	1 <sup>st</sup>	Revision of Engineering Drawing of 1st Year
2		2 <sup>nd</sup>	Isometric projection
3		3 <sup>rd</sup>	Orthogonal projection
4		4 <sup>th</sup>	1 <sup>st</sup> angle vs 3 <sup>rd</sup> angle projection
5		5 <sup>th</sup>	Explanation with drawing
6		6 <sup>th</sup>	Drawing sheet evaluation
7	2 <sup>nd</sup>	1 <sup>st</sup>	Draw plan, elevation and side view of different machine elements from their isometric view using AutoCAD & mini drafter (Minimum 5 Drawings).
8		2 <sup>nd</sup>	Using sheet Drawing no 1-3
9		3 <sup>rd</sup>	4-5
10		4 <sup>th</sup>	Using AutoCAD
11		5 <sup>th</sup>	Drawing no 1-3
12		6 <sup>th</sup>	4-5
13	3 <sup>rd</sup>	1 <sup>st</sup>	Drawing of Bolt,
14		2 <sup>nd</sup>	Do
15		3 <sup>rd</sup>	Drawing of nut and
16		4 <sup>th</sup>	Do
17		5 <sup>th</sup>	Drawing of threads
18		6 <sup>th</sup>	Do
19	4 <sup>th</sup>	1 <sup>st</sup>	Do
20		2 <sup>nd</sup>	Assembly drawing concept
21		3 <sup>rd</sup>	Cotter joint
22		4 <sup>th</sup>	Side, front, top view
23		5 <sup>th</sup>	Do
24		6 <sup>th</sup>	Do
25	5 <sup>th</sup>	1 <sup>st</sup>	Do
26		2 <sup>nd</sup>	Sheet evaluation
27		3 <sup>rd</sup>	Knuckle joint
28		4 <sup>th</sup>	Uses and practical application
29		5 <sup>th</sup>	Assembly of different parts
30		6 <sup>th</sup>	Do
31	6 <sup>th</sup>	1 <sup>st</sup>	Do
32		2 <sup>nd</sup>	Do
33		3 <sup>rd</sup>	Sheet evaluation
34		4 <sup>th</sup>	Bearing concept and uses
35		5 <sup>th</sup>	Drawing of rigid pedestal bearing
36		6 <sup>th</sup>	Assembly of different parts
37	7 <sup>th</sup>	1 <sup>st</sup>	Do
38		2 <sup>nd</sup>	Do
39		3 <sup>rd</sup>	Do
40		4 <sup>th</sup>	Sheet evaluation
41		5 <sup>th</sup>	Foot step bearing
42		6 <sup>th</sup>	Assembly of different parts

43	8 <sup>th</sup>	1 <sup>st</sup>	Do
44		2 <sup>nd</sup>	Do
45		3 <sup>rd</sup>	Do
46		4 <sup>th</sup>	Sheet evaluation
47		5 <sup>th</sup>	Simple Screw jack
48		6 <sup>th</sup>	Uses and application
49	9 <sup>th</sup>	1 <sup>st</sup>	Assembly of all parts
50		2 <sup>nd</sup>	Do
51		3 <sup>rd</sup>	Do
52		4 <sup>th</sup>	Do
53		5 <sup>th</sup>	Sheet evaluation
54		6 <sup>th</sup>	Connecting rod of IC Engine
55	10 <sup>th</sup>	1 <sup>st</sup>	Assembly drawing
56		2 <sup>nd</sup>	Uses and application
57		3 <sup>rd</sup>	Do
58		4 <sup>th</sup>	Do
59		5 <sup>th</sup>	Do
60		6 <sup>th</sup>	Do
61	11 <sup>th</sup>	1 <sup>st</sup>	Sheet evaluation
62		2 <sup>nd</sup>	Boiler safety valve
63		3 <sup>rd</sup>	Assembly drawing
64		4 <sup>th</sup>	Uses and application
65		5 <sup>th</sup>	Do
66		6 <sup>th</sup>	Do
67	12 <sup>th</sup>	1 <sup>st</sup>	Do
68		2 <sup>nd</sup>	Do
69		3 <sup>rd</sup>	Sheet evaluation
70		4 <sup>th</sup>	Spring loaded valve
71		5 <sup>th</sup>	Assembly drawing
72		6 <sup>th</sup>	Uses and application
73	13 <sup>th</sup>	1 <sup>st</sup>	Do
74		2 <sup>nd</sup>	Do
75		3 <sup>rd</sup>	Do
76		4 <sup>th</sup>	Sheet evaluation
77		5 <sup>th</sup>	Hydraulic non return valve
78		6 <sup>th</sup>	Assembly drawing
79	14 <sup>th</sup>	1 <sup>st</sup>	Uses and application
80		2 <sup>nd</sup>	Do
81		3 <sup>rd</sup>	Do
82		4 <sup>th</sup>	Do
83		5 <sup>th</sup>	Sheet evaluation
84		6 <sup>th</sup>	Flat belt pulley
85	15 <sup>th</sup>	1 <sup>st</sup>	Do
86		2 <sup>nd</sup>	Do
87		3 <sup>rd</sup>	Do
88		4 <sup>th</sup>	Do
89		5 <sup>th</sup>	Sheet submission
90		6 <sup>th</sup>	Final sheet evaluation

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