

GOVERNMENT POLYTECHNIC, NUAPADA
Academic Lesson Plan for Winter semester- 2023-24

Name of the teaching faculty: Er.Siddhant Singh Babu

Department: Mechanical Engineering

Semester: 3rd

Subject: Engineering Material

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 st	1 st	Material classification
2.		2 nd	Description of ferrous and non ferrous category
3.		3 rd	Alloys
4.		4 th	Types of alloys
5.	2 nd	1 st	Properties of metal
6.		2 nd	Physical , Chemical and Mechanical
7.		3 rd	Performance requirements
8.		4 th	Material reliability and safety
9.	3 rd	1 st	Characteristics of ferrous materials
10.		2 nd	application of ferrous materials
11.		3 rd	Classification of low carbon steel
12.		4 th	composition of low carbon steel
13.	4 th	1 st	application of low carbon steel
14.		2 nd	Classification of Medium carbon steel
15.		3 rd	composition of Medium carbon steel
16.		4 th	application of Medium carbon steel
17.	5 th	1 st	Classification of High carbon
18.		2 nd	Composition of High carbon steel
19.		3 rd	Application of High carbon steel
20.		4 th	Alloy steel
21.	6 th	1 st	Low alloy steel
22.		2 nd	high alloy steel
23.		3 rd	Tool steel
24.		4 th	Stainless steel
25.	7 th	1 st	Tool steel
26.		2 nd	Effect of various alloying elements such as Cr, Mn, Ni, V, Mo
27.		3 rd	Cooling curves
28.		4 th	Concept of phase diagram
29.	8 th	1 st	Crystal definition and classification
30.		2 nd	Features of Iron-Carbon diagram
31.		3 rd	with salient micro-constituents of Iron and Steel
32.		4 th	Classification of crystals
33.	9 th	1 st	Crystal imperfections
34.		2 nd	Classification of imperfection
35.		3 rd	Point defects
36.		4 th	line defects
37.	10 th	1 st	Volume defects
38.		2 nd	Surface defects
39.		3 rd	Types and causes of point defects

		4 th	Vacancies
44.	11 th	1 st	Interstitials and impurities
		2 nd	Types and causes of line defects
		3 rd	Edge dislocation
		4 th	Screw dislocation
45.	12 th	1 st	Effect of imperfection on material properties
46.		2 nd	Deformation by slip and twinning
47.		3 rd	Deformation by slip and twinning
48.		4 th	Effect of deformation on material properties
49.	13 th	1 st	Purpose of Heat treatment
50.		2 nd	Process of heat treatment: Annealing, normalizing, hardening, tempering
51.		3 rd	Stress relieving measures
52.		4 th	Surface hardening: Carburizing and Nitriding
53.	14 th	1 st	and Effect of heat treatment on properties of steel
54.		2 nd	Hardenability of steel
55.		3 rd	Aluminum alloys: Composition, property and usage of Duralmin, γ -alloy.
56.		4 th	Copper alloys: Composition, property and usage of Copper-
57.	15 th	1 st	Aluminum, Copper-Tin, Babbit, Phosperous bronze, brass, Copper-Nickel
58.		2 nd	Predominating elements of lead alloys, Zinc alloys and Nickel alloys
59.		3 rd	Low alloy materials like P-91, P-22 for power plants and other high temperature
60.		4 th	High alloy materials like stainless steel grades of duplex, super duplex materials etc.

The lesson plan prepared by the concerned faculty

Siddhant Singh Babu
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GF, MECHANICAL DEPARTMENT

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Academic Lesson Plan for Winter semester- 2023-24

Name of the teaching faculty: Er.Siddhant Singh Babu

Semester: 3rd

No. of periods per week: 4

End semester exam: 80

Total Marks : 100

Department: Mechanical Engineering

Subject: Thermal Engg-1

Total Periods: 60

Class test: 20

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

22.		2 nd	Free expansion & throttling process.
23.		3 rd	Explain & classify I.C engine.
24.		4 th	Terminology of I.C Engine such as bore, dead centers, stroke volume and piston speed
25.	7 th	1 st	Explain the working principle of 2-stroke engines
26.		2 nd	Explain the working principle of 4- stroke engine S.I engine
27.		3 rd	Explain the working principle of 2-stroke & 4- stroke engine C.I engine.
28.		4 th	Differentiate between 2-stroke & 4stroke engine C.I engine
29.	8 th	1 st	Differentiate between 2-stroke & 4-stroke engine C.I engine
30.		2 nd	Study of valve timing diagram
31.		3 rd	What is thermodynamic cycle
32.		4 th	Carnot cycle
33.	9 th	1 st	p-v diagram with process.
34.		2 nd	. Solve simple numerical
35.		3 rd	Otto cycle.
36.		4 th	p-v diagram with process
37.	10 th	1 st	. Solve simple numerical
38.		2 nd	Diesel cycle
39.		3 rd	p-v diagram with process
40.		4 th	. Solve simple numerical
41.	11 th	1 st	Dual cycle
42.		2 nd	p-v diagram with process
43.		3 rd	. Solve simple numerical
44.		4 th	Efficiency comparison between all
45.	12 th	1 st	Comparison between all cycles
46.		2 nd	Define Fuel. Types of fuel
47.		3 rd	Application of different types of fuel.
48.		4 th	Solid and liquid fuels
49.	13 th	1 st	Gaseous fuels
50.		2 nd	Heating values of fuel
51.		3 rd	Quality of I.C engine fuels
52.		4 th	Octane number and cetane number rating
53.	14 th	1 st	Cetane number
54.		2 nd	Previous years paper discussion
55.		3 rd	Previous years paper discussion
56.		4 th	Previous years paper discussion
57.	15 th	1 st	Revision
58.		2 nd	Revision
59.		3 rd	Revision
60.		4 th	Revision

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Academic Lesson Plan for Winter semester- 2023-24

Name of the teaching faculty: Er. Siddhant Singh Babu
 Semester: 5th
 No. of periods per week: 4
 End semester exam: 50
 Total Marks: 75

Department: Mechanical Engineering
 Subject: Hydraulic Machine & IFP Lab
 Total Periods: 60
 Sessional: 25

Sl. No.	Week	Period	Topic to be covered
1.	1 st	1 st	Performance test on impulse turbine
2.		2 nd	and to find out the efficiency
3.		3 rd	Study of characteristicstics graph
4.		4 th	Animation view of working of pelton wheel turbine
5.	2 nd	1 st	Performance test on Kaplan turbine
6.		2 nd	and to find out the efficiency
7.		3 rd	Study of characteristicstics graph
8.		4 th	Animation view of working of kaplan turbine
9.	3 rd	1 st	Performance test on Francis turbine
10.		2 nd	and to find out the efficiency
11.		3 rd	Study of characteristicstics graph
12.		4 th	Animation view of working of fransis turbine
13.	4 th	1 st	Performance test on centrifugal pump
14.		2 nd	Findout the power required
15.		3 rd	and to find out the characteristic curves
16.		4 th	Animation view of working of centrifugal pump
17.	5 th	1 st	Direct operation of single acting pneumatic cylinder.
18.		2 nd	Direct operation of double acting pneumatic cylinder
19.		3 rd	Study of different connection in single acting pneumatic cylinder
20.		4 th	Study of different connection in double acting pneumatic cylinder
21.	6 th	1 st	Operating double acting pneumatic cylinder
22.		2 nd	with quick exhaust valve
23.		3 rd	Meter-in connection
24.		4 th	Meter-out connection
25.	7 th	1 st	Speed control double acting pneumatic cylinder
26.		2 nd	using metering in circuits
27.		3 rd	metering ou+ circuits.
28.		4 th	Animation view of actual working
29.	8 th	1 st	Direct operation of single acting hydraulic cylinder
30.		2 nd	double acting hydraulic cylinder
31.		3 rd	Connection establishment
32.		4 th	Meter-in and out connection
33.	9 th	1 st	Direct operation of hydraulic motor
34.		2 nd	Study of different parts
35.		3 rd	Connection establishment
36.		4 th	Animation view of its working
37.	10 th	1 st	Speed control double acting hydraulic cylinder
38.		2 nd	using metering in
39.		3 rd	& metering out circuits.

40.		4 th	Connection establishment
41.	11 th	1 st	Viva voce test-1 (experiment-1)
42.		2 nd	Viva voce test-1 (experiment-2)
43.		3 rd	Viva voce test-1 (experiment-3)
44.		4 th	Viva voce test-1 (experiment-4)
45.	12 th	1 st	Viva voce test-1 (experiment-5)
46.		2 nd	Viva voce test-1 (experiment-6)
47.		3 rd	Viva voce test-1 (experiment-7)
48.		4 th	Viva voce test-1 (experiment-8)
49.	13 th	1 st	Viva voce test-1 (experiment-9)
50.		2 nd	Viva voce test-1 (experiment-10)
51.		3 rd	Record checking of the students 1
52.		4 th	Record checking of the students 2
53.	14 th	1 st	Study of Application of turbines by using smart class room
54.		2 nd	Study of Application of pump by using smart class room
55.		3 rd	Study of Application of hydraulic system by using smart class room
56.		4 th	Study of Application of pneumatic system by using smart class room
57.	15 th	1 st	Grand viva voce test- 1
58.		2 nd	Grand viva voce test- 2
59.		3 rd	Record submission by student
60.		4 th	Record checking and final Marking

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of the teaching faculty: Er. Siddhant Singh Babu
Semester: 5th
No. of periods per week: 4
End semester exam: 80
Total Marks: 100

Department: Mechanical Engineering
Subject: Hydraulic Machine & industrial fluid power
Total Periods: 60
Class test: 20

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

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

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