LESSON PLAN FOR DESIGN OF MACHINE ELEMENTS

ACADEMIC YEAR: 2021-22		
Mechanical Engineering	**5th semester**	**ER. KALIA SETHI**
DESIGN OF MACHINE ELEMENTS	Lecture: 04/week	Semester :5TH
		No. of weeks :15
WEEK	**CLASS DAY**	**THEORY TOPICS**
1	1ST (CH1)	Introduction to Machine Design , course outcomes.
	2nd	Classification of machine design, Stresses related to machine design,Stressconcentration
	3rd	Engineering materials used in design, properties of material.
	4th	Stress- strain curve for ductile and brittle material(Mild steel& Cast iron)
2	1st	Working stress, yield stress, ultimate stress. Factor of safety for ductile and brittle material.
	2nd	Modes of failure(elastic deflection,yielding & fracture)
	3rd	Factors governing the design of machine elements
	4th	General procedure in machine design
3	1ST (CH2)	Fastening elements and types of fastening
	2nd	Welding and types of welded joints.
	3rd	Advantages and disadvantages of welded joints over other joints
	4th	Strength of transeverse and parallel fillet welded joint
4	1st	Simple numericals on welding joint
	2nd	Design of welded joints for eccentric loads
	3rd	Different cases of eccentric load and derivations
	4th	Numericals on eccentric loaded welding joint.
5	1st	Riveted joint,types of riveted joint.
	2nd	Failures of riveted joint.
	3rd	Determination of strength and efficiency of riveted joint.
	4th	Design of riveted joint for pressure vessel(boiler)
6	1st	Numericals on design of riveted joints.
	2nd	Numericals on design of riveted joints.
	3rd	Class test.
	4TH (CH3)	Introduction to shaft,functions,materials of shaft
7	1st	Design of shaft on basis of strength
	2nd	Design of shaft on basis of strength
	3rd	Design of shaft on basis of rigidity
	4th	Design of shaft on basis of rigidity
8	1st	Numericals on design of shafts
	2nd	Numericals on design of shafts
	3rd	function of keys, types of keys
	4th	Material of keys, Failures of key,causes,effect of key way
9	1st	Design rectangular sunk key and solving numericals
	2nd	Design rectangular sunk key and solving numericals
	3rd	Numericals on empirical relation of rectangular sunk key
	4th	Specifications of parallel,gibhead,taper key

	1st	Class work on key and shaft
	2nd (CH4)	Introduction to coupling, design of shaft coupling
	3rd	Requirements of a good shaft coupling. Types of coupling.
10	4th	Design of sleeve coupling
	1st	Design of clamp or compression coupling
	2nd	Numerical on design of coupling.
	3rd	Numerical on design of coupling.
11	4th (CH5)	Introduction to spring and types(open and closed)
	1st	Materials used and application of spring
	2nd	SWG ,specifications of spring.
	3rd	Spring terms for compression type
12	4th	Different stresses in helical spring(circular)
	1st	Different stresses in helical spring(circular)
	2nd	Deflection of helical spring of circular wire
	3rd	Numerical on deflection of helical spring
13	4th	Surge in spring and how to avoid it
	1st	Design of closed coil helical compression spring
	2nd	Design of closed coil helical compression spring
	3rd	Numericals on design of spring
14	4th	Numericals on design of spring
	1st	Doubt clearing of all topics of subject
	2nd	Model question paper practice
	3rd	Model question paper practice
15	4th	Closing of subject, course outcomes

TOTAL PERIODS: 60
NO. OF WEEKS : 15

LESSON PLAN FOR POWER STATION ENGINEERING

ACADEMIC YEAR: 2021-22		
Mechanical Engineering	6th semester	Er. Kalia Sethi
POWER STATION ENGINEERING	04/week	Semester : 6TH
		No. of weeks :15
Week	**Class day**	**Theory topics**
1	1st	Introduction, Course outcomes, Reference books for subject.
	2nd	Description of source of energy
	3rd	Central and captive power station
	4th	Classification of power plants
2	1st	Layout and different circuits of steam power plant
	2nd	Steam power cycle and terms used in power plant.
	3rd	Steam power cycle terms
	4th	Rankine cycle, derivations of workdone and efficiency
3	1st	Rankine cycle specific steam consumption, work ratio
	2nd	Numericals on Rankine cycle
	3rd	Numericals and class work on Rankine cycle
	4th	Reheat Rankine cycle, Regenerative Rankine cycle
4	1st	Combination of Reheat-regenerative cycle
	2nd	Application, advantages, disadvantages of all.
	3rd	Boiler accessories and purposes
	4th	Boiler accessories and need of boiler mountings
5	1st	Draught system, advantages and disadvantages
	2nd	Elements of steam turbine, compounding.
	3rd	Governing of steam turbine and performance
	4th	Numerical on steam turbine and introduction to condenser.
6	1st	Classification , function and auxiliaries of condenser.
	2nd	Cooling tower, function, types and application.
	3rd	Introduction , importance of Nuclear power plant.
	4th	Classification of nuclear fuels, Fusion& Fission reaction
7	1st	Nuclear reactor, components, brief description.
	2nd	Moderator, reflector in Nuclear power plant
	3rd	Coolant and control road in Nuclear power plant
	4th	Shielding and reactor vessel.
	1st	Types of nuclear reactor and application
	2nd	Working of PWR power plant

8	3rd	Working of BWR power plant
	4th	Comparision of Nuclear and Thermal power plant.
9	1st	Disposal of nuclear waste
	2nd	Conducting class test on nuclear power plant
	3rd	Diesel power plant , advantages and disadvantages
	4th	Different systems of diesel power plant
10	1st	Different systems of diesel power plant
	2nd	Discussion of Diesel power plant, Nuclear and Thermal power plant.
	3rd	Assignments on Diesel power plant, Nuclear and Thermal power plant.
	4th	Introduction to Hydel power plant
11	1st	Importance of Hydel power plant. Selection of sites for Hydel plant.
	2nd	Future aspects of Hydel power plant
	3rd	Advantages and disadvantages of Hydel plant. Classification of Hydel power plant
	4th	General arrangement of storage type Hydel project
12	1st	General arrangement of storage type Hydel project
	2nd	General arrangement of storage type Hydel project
	3rd	Operation of hydel power plant
	4th	Operation of hydel power plant
13	1st	Hydro power station units present in India.
	2nd	Types of hydro Turbines and generation used.
	3rd	Introduction to gas turbine power station
	4th	Selection of sites for gas power plant. Fuels used for gas turbine.
14	1st	Elements used in gas power plant and their working.
	2nd	Advantages, disadvantages and application of gas turbine power plant.
	3rd	Overall discussion of gas turbine power plant.
	4th	Overall discussion and doubt clearing of all topics of the subject.
15	1st	Explaining different power plants through video lectures.
	2nd	Model question set practice.
	3rd	Model question set practice.
	4th	Course outcome discussion and closing of Lecture.

TOTAL PERIODS: 60
NO. OF WEEKS : 15

LESSON PLAN FOR ENGINEERING MECHANICS

ACADEMIC YEAR: 2021-22		
Mechanical Engineering	**2ND semester**	**Er. Kalia Sethi**
ENGINEERING MECHANICS	04/week	Semester : 2ND
		No. of weeks :15
Week	Class day	Theory topics
1	1st	Introduction, Course outcomes, Reference books for subject.
	2nd	Force, characteristics, effect and classification of force.
	3rd	Action and reaction force, free body diagram
	4th	Resolution of a force, methods, types of components force
2	1st	Numericals on resolution of force.
	2nd	Resultant force, Parallelogram law of forces
	3rd	Numericals on resultant force
	4th	Space diagram, vector diagram and numericals ny graphical method
3	1st	Force systems , resultant of force systems
	2nd	Moment, classification and sign conventions of moment.
	3rd	Law of moment, Varignon's theorem
	4th	Numericals on moment, like & unlike parallel forces
4	1st	Couple, units, properties of couple.
	2nd	Numerical of couple and class test
	3rd	Introduction to equilibrium and condition of equilibrium
	4th	Lami's theorem, application of equilibrium
5	1st	Numerical on Lami's theorem .
	2nd	Numerical on Lami's theorem .
	3rd	Class test of chapter 1&2.
	4th	Introduction to Friction , application of friction
6	1st	Limiting friction, coefficient of friction , angle of friction, angle of repose.
	2nd	Numericals on friction in horizontal plane
	3rd	Law of friction, advantages and disadvantages of friction.
	4th	Friction in inclined plane.
	1st	Numerical on friction in inclined plane
	2nd	Numerical on friction in inclined plane

7	3rd	Application of friction(Ladder and wedge)
	4th	Numericals on Ladder friction
8	1st	Class test on friction topic.
	2nd	Introduction to Centre of Gravity(C.G). Importance of C.G
	3rd	Centroid , C.G for common geometric shapes
	4th	Axis of reference, C.G of plane figures, symmetry section.
9	1st	Centroid of composite figures.
	2nd	Numericals on centre of gravity
	3rd	Numericals on centre of gravity
	4th	Class work of numericals on C.G
10	1st	Introduction to Moment of Inertia(MI) , application of MI.
	2nd	Parallel axis theorem and perpendicular axis theorem.
	3rd	Moment of inertia of plane lamina and different sections
	4th	Numericals on Moment of Inertia for engineering sections
11	1st	Numericals on Moment of Inertia for engineering sections
	2nd	Class test on CG and MI
	3rd	Introduction to machine and general uses of machine
	4th	Simple machine, types, efficiency of machine
12	1st	Ideal machine, velocity ratio, mechanical advantages.
	2nd	Relationship of VR, MA and efficiency. Numerical on simple machines
	3rd	Law of machine. Numericals on law of machine
	4th	Reversibility and self locking conditions of machine
13	1st	Simple axle, worm& worm wheel, crab winch
	2nd	Simple gear train and compound gear train
	3rd	Numerical on Gear train
	4th	Simple screw jack, application of screw jack
14	1st	Numericals on simple machine
	2nd	Introduction to Dynamics, classification.
	3rd	Newton's laws of motion, De-Alembert's principle
	4th	Simple numericals on motion of body
	1st	Work, power, energy. Types of energy and applications

15	2nd	Momentum, Impulse, Conservation of energy	
	3rd	Collision, Coefficient of restitution	
	4th	Model question paper practice. Closing of subject.	

TOTAL PERIODS: 60
NO. OF WEEKS : 15

LESSON PLAN FOR THERMAL ENGINEERING-1

ACADEMIC YEAR: 2021-22		
Mechanical Engineering	**3RD semester**	**Er. Kalia Sethi**
THERMAL ENGINEERING-1	04/week	Semester : 3RD
		No. of weeks :15
Week	**Class day**	**Theory topics**
1	1st	Introduction, Course outcomes, Reference books for subject.
	2nd	Thermodynamic system and types of thermodynamic system.
	3rd	Thermodynamic properties and classification of properties
	4th	Thermodynamic process,path, cycle,state.
2	1st	Point function and path function and their comparision.
	2nd	Thermodynamic equilibrium ,types and their examples.
	3rd	Quasistatic process and its importance.
	4th	Energy, source of energy and energy conservation.
3	1st	Heat and work as energy.
	2nd	Comparision between heat and work , mechanical equivalent of heat
	3rd	Work and heat transfer, displacement work.
	4th	Revision of thermodynamic concepts assignments of chapter-1.
4	1st	Brief introduction on laws of thermodynamics.
	2nd	Zeroth law of thermodynamics and its importance in thermal equilibrium.
	3rd	First law of thermodynamics for a closed system undergoing a cycle.
	4th	Internal energy as a system properties.
5	1st	Limitations of first law of thermodynamics.
	2nd	Steady flow energy equation. Application of first law of thermodynamic to turbine , compressor,nozzle and diffuser.
	3rd	Problem solving on 1st law thermodynamic.
	4th	Second law thermodynamics, statements and application to heat engine, heat pump and refrigerator.
6	1st	C.O.P and efficiency comparision of heat engine, heat pump and refrigerator.
	2nd	Introduction to concept of entropy.
	3rd	Problem solving on efficiency and COP.
	4th	Overall discussion of laws of thermodynamics and assignment work.

7	1st	Introduction to perfect gas. Comparision of real gasses to perfect gas.
	2nd	Boyle's law, Charle's law ,Guy-lussac law.
	3rd	Avogaadro's law,Dalton's law f partial pressure.
	4th	General gas equation , gas constant, universal gas constant and their values.
8	1st	Specific heats of gas. C_p,C_v and their relationships.
	2nd	Enthalpy of a gas and workdone calculation for a non-flow process.
	3rd	Application of 1st law to different thermodynamic processes .
	4th	Application of 1st law to different thermodynamic processes .
9	1st	Problem solving on non-flow processes.
	2nd	Free expansion,examples of free expansion and throttling process.
	3rd	Overall discussions on processes of perfect gas
	4th	Introduction to engine and its types.
10	1st	Internal combustion engine and its application.
	2nd	Terminologies of I.C engine.
	3rd	Working principle of 2-S and 4-S S.I engine.
	4th	Working principle of 2-S and 4-S C.I engine.
11	1st	Comparision of two stroke and four stroke engine. Comparision of C.I and S.I engine.
	2nd	Overall discussions on I.C engine and assignment.
	3rd	Introduction to air standard cycle and assumptions of air standard cycle.
	4th	Carnot cycle and its drawback
12	1st	Problem solving on carnot cycle workdone and efficiency.
	2nd	Otto cycle workdone and efficiency.
	3rd	Problem solving on otto cycle.
	4th	Calculation of Diesel cycle workdone and efficiency.
13	1st	Problem solving on Diesel cycle workdone and efficiency.
	2nd	Calculation of dual combustion cycle workdone and efficiency.
	3rd	Problem solving on dual combustion cycle

		workdone and efficiency.
	4th	Workdone and efficiency comparision of Otto,Diesel and Dual combustion cycle.
14	1st	Overall discussion on gas power cycle. Assignment work.
	2nd	Fuel and types of fuel.
	3rd	Application of different types of fuel.
	4th	Calorific and heating values of fuel.
15	1st	Octane number, cetane number and their comparision.
	2nd	Overall discussion.
	3rd	Solving semester questions of previous year.
	4th	Model question paper practice.

TOTAL PERIODS: 60
NO. OF WEEKS : 15