

**UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING,
ROURKELA**



LESSON PLAN

SESSION-2022-23

SUBJECT: ENGINEERING MECHANICS (THEORY-4)

**DEPARTMENT OF
MECHANICAL ENGINEERING**

Semester: 1ST		Name of the Teaching Faculty: ER SISIR KUMAR DALAI, WORKSHOP SUPERINTENDENT
Discipline: MECHANICAL ENGINEERING		
Subject: ENGINEERING MECHANICS (TH-4)	No. of days/per week class allotted: 04	Semester From date: 25.10.2022 To Date: 31.01.2023 No. of Weeks: 15
Week	Class/Day	Theory / Practical Topics
1ST	1ST	Definitions of Mechanics, Statics, Dynamics, Rigid Bodies
	2ND	Force System. Definition, Classification of force system according to plane & line of action.
	3RD	Characteristics of Force & effect of Force. Principles of Transmissibility & Principles of Superposition. Action & Reaction Forces & concept of Free Body Diagram.
	4TH	Resolution of a Force. Definition, Method of Resolution, Types of Component forces, Perpendicular components & non-perpendicular components.
2ND	1ST	Composition of Forces. Definition, Resultant Force, Method of composition of forces.
	2ND	Analytical Method such as Law of Parallelogram of forces & method of resolution.
	3RD	Graphical Method. Introduction, Space diagram, Vector diagram, Polygon law of forces.
	4TH	Resultant of concurrent, non-concurrent & parallel force system by Analytical & Graphical Method.
3RD	1ST	Moment of Force. Definition, Geometrical meaning of moment of a force, measurement of moment of a force & its S.I units.
	2ND	Classification of moments according to direction of rotation, sign convention.
	3RD	Law of moments, Varignon's Theorem
	4TH	Couple – Definition, S.I. units, measurement of couple.
4TH	1ST	Properties of couple, simple problems on Force systems

	2 ND	Introduction to Equilibrium, Definition, condition of equilibrium.
	3 RD	Analytical & Graphical conditions of equilibrium for concurrent, non-concurrent & Free Body Diagram.
	4 TH	Lami's Theorem – Statement, Application for solving various engineering problems.
5 TH	1 ST	Definition of friction & Frictional forces
	2 ND	Define Limiting frictional force & Coefficient of Friction.
	3 RD	Define Angle of Friction & Repose & Laws of Friction
	4 TH	Advantages & Disadvantages of Friction.
6 TH	1 ST	Discussion General friction problem
	2 ND	Solving problem
	3 RD	Solving Problem
	4 TH	Equilibrium of bodies on level plane – Force applied on horizontal plane
7 TH	1 ST	Problem solved of Force applied on horizontal plane
	2 ND	Equilibrium of bodies on level plane – Force applied on inclined plane
	3 RD	Solving Problems of Force applied on inclined plane
	4 TH	Ladder, Wedge Friction
8 TH	1 ST	Solving Problems of Ladder friction
	2 ND	Solving Problems of Ladder friction
	3 RD	Solving Problems of Wedge friction
	4 TH	Introduction to centroid and M.I, Lami's Theorem – Statement, Application for solving various engineering problems.
9 TH	1 ST	Centroid of geometrical figures such as squares, rectangles, triangles, circles, semicircles & quarter circles.
	2 ND	Centroid of composite figures, problems on centroid
	3 RD	Moment of Inertia – Definition, Parallel axis & Perpendicular axis Theorems.
	4 TH	M.I. of plane lamina & different engineering sections.
10 TH	1 ST	Problems on M.I and revision.
	2 ND	Definition of simple machine, velocity ratio of simple and compound gear train.
	3 RD	Explain simple & compound lifting machine
	4 TH	Define M.A, V.R.& Efficiency and State the relation between them.
	5 TH	State Law of Machine, Reversibility of Machine, Self-Locking Machine.

11TH	1ST	Study of simple machines – simple axle & wheel.
	2ND	Solving problems of simple axle & wheel.
	3RD	Discuss Single purchase crab winch.
	4TH	Solving problems of Single purchase crab winch.
12TH	1ST	Discuss double purchase crab winch.
	2ND	Solving problems of double purchase crab winch
	3RD	Discuss Worm & Worm Wheel
	4TH	Solving problems of Worm& Worm Wheel
13TH	1ST	Discuss Screw Jack
	2ND	Solving problems of screw jack
	3RD	Types of hoisting machine-like derricks etc. Their use and working principle
	4TH	Kinematics & Kinetics, Principles of Dynamics, Newton's Laws of Motion
14TH	1ST	Motion of Particle acted upon by a constant force, Equations of motion
	2ND	De-Alembert's Principle, Work, Power, Energy & its Engineering Applications
	3RD	Kinetic & Potential energy & its application.
	4TH	Momentum & impulse, conservation of energy & linear momentum
15TH	1ST	Collision of elastic bodies, and Coefficient of Restitution.
	2ND	Revision
	3RD	Revision
	4TH	Revision

Learning Resources:

1. Text Book of Engineering Mechanics – R.S Khurmi (S. Chand).
2. Engineering Mechanics – A.R. Basu (TMH Publication Delhi)
3. Engineering Machines – Basudev Bhattacharya (Oxford University Press).