

# UTKAL GOURAV MADHUSUDAN INSTITUTE OF TECHNOLOGY, RAYAGADA

## Academic Lesson Plan for 2nd Semester – 2024 (Summer)

Name of teaching faculty: Sri Aswin Pradhan,

Guest Faculty Lecturer (Mechanical)

Discipline/Deptt: Mathematics & Science

Semester & Branch: 2<sup>nd</sup> Sem, Civil & Mechanical Engg.

Subject (Theory): TH4: Engg. Mechanics

No. of periods per week: 4

Total Periods: 60

End semester Exam: 80 Marks,

Class Test(I.A): 20 Marks,

Total Marks: 100 Marks

Week	Date	Period	Unit/ Chapter	Topics to be covered
1 <sup>st</sup>		1	1.1	Fundamentals. Definitions of Mechanics, Statics, Dynamics, Rigid Bodies,
		1	1.2	Force System. Definition, Classification of force system according to plane & line of action.
		1	1.2	Characteristics of Force & effect of Force. Principles of Transmissibility & Principles of Superposition. Action & Reaction Forces & concept of Free Body Diagram.
		1	1.3	Resolution of a Force. Definition, Method of Resolution, Types of Component forces, Perpendicular components & non- perpendicular components.
2 <sup>nd</sup>		1	1.4	Composition of Forces. Definition, Resultant Force, Method of composition of forces
		1	1.4.1	Analytical Method such as Law of Parallelogram of forces & method of resolution.
		1	1.4.2	Graphical Method. Introduction, Space diagram, Vector diagram, Polygon law of forces.
		1	1.4.3	Resultant of concurrent, non-concurrent & parallel force system by Analytical & Graphical Method.
3 <sup>rd</sup>		1	1.5	Moment of Force. Definition, Geometrical meaning of moment of a force, measurement of moment of a force & its S.I units.
		1	1.5	Classification of moments according to direction of rotation, sign convention,
		1	1.5	Law of moments, Varignon's Theorem
		1	1.5	Couple – Definition, S.I. units, measurement of couple
4 <sup>th</sup>		1	1.5	properties of couple, simple problems on Force systems
		1	2.1	Introduction to Equilibrium, Definition, condition of equilibrium
		1	2.1	Analytical & Graphical conditions of equilibrium for concurrent, non-concurrent & Free Body Diagram.
		1	2.2	Lami's Theorem – Statement, Application for solving

				various engineering problems.
5 <sup>th</sup>		1		Revision- CH-1& 2
		1	3.1	Definition of friction& Frictional forces
		1	3.1	Define Limiting frictional force & Coefficient of Friction.
		1	3.1	Define Angle of Friction & Repose & Laws of Friction
6 <sup>th</sup>		1	3.1	Advantages & Disadvantages of Friction.
		1		Friction problem
		1		Friction problem
		1		Friction problem
7 <sup>th</sup>		1	3.2	Equilibrium of bodies on level plane – Force applied on horizontal plane
		1		Problem solved of Force applied on horizontal plane
		1	3.2	Equilibrium of bodies on level plane – Force applied on inclined plane
		1	3.2	Problem solved of Force applied on inclined plane
8 <sup>th</sup>		1	3.3	Ladder, Wedge Friction
		1		Problems solved on Ladder friction
		1		Problems solved on Ladder friction
		1		Problems solved on wedge friction
9 <sup>th</sup>		1		Revision- CH-3
		1	4.1	Introduction to centroid and M.I, Lamia's Theorem – Statement, Application for solving various engineering problems.
		1	4.1	Centroid of geometrical figures such as squares, rectangles, triangles, circles, semicircles & quarter circles
10 <sup>th</sup>		1	4.1	Centroid of composite figures, problems on centroid
		1	4.2	Moment of Inertia – Definition, Parallel axis & Perpendicular axis Theorems
		1	4.2	M.I. of plane lamina & different engineering sections.
		1		Problems on M.I
11 <sup>th</sup>		1		Problems on M.I
		1	5.1	Definition of simple machine, velocity ratio of simple and compound gear train
		1	5.1	Explain simple & compound lifting machine
		1	5.1	Define M.A, V.R.& Efficiency and State the relation between them
12 <sup>th</sup>		1	5.1	State Law of Machine, Reversibility of Machine, Self- Locking Machine.
		1	5.2	Study of simple machines – simple axle & wheel
		1	5.2	Problems solved on simple axle & wheel
		1	5.2	Discussion about Single purchase crab winch
13 <sup>th</sup>		1	5.2	Problem solved on Single purchase crab winch
		1	5.2	Discussion about double purchase crab winch
		1	5.2	Problems on double purchase crab winch
	1	5.2	Discussion of Worm & Worm Wheel	

		1	5.2	Problems on Worm& Worm Wheel
14 <sup>th</sup>		1	5.2	Screw Jack
		1	5.2	Problems solved on screw jack
		1	5.3	Types of hoisting machine-like derricks etc. Their use and working principle
		1	6.1	Kinematics & Kinetics, Principles of Dynamics, Newton's Laws of Motion.
15 <sup>th</sup>		1	6.1	Motion of Particle acted upon by a constant force, Equations of motion
		1	6.2	De-Alembert's Principle, Work, Power, Energy & its Engineering Applications.
		1	6.3	Kinetic & Potential energy & its application, Momentum & impulse, conservation of energy & linear momentum
		1	6.3	collision of elastic bodies, and Coefficient of Restitution

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