MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN			
Department of Mechanical Engineering			
Name of the Subject	Engineering Mechanics	Name of the handling Faculty	Mr.Mohan S R
Subject Code	ME 3351	Year / Sem	II/III
Acad Year	2023-24	Batch	2022-26

Course Objective

1.To understand the basics of mechanics and apply the concept of equilibrium of system of forces

2.To understand the concept of equilibrium and to solve problems of rigid bodies

3.To learn about the centroid and centre of gravity of objects and moment of inertia

4.To learn the basic concepts of friction

5.To learn the concepts in kinematics and kinetics of rigid bodies in plane motion

Course Outcome

CO1-Illustrate the vectorial and scalar representation of forces and moments

CO2-Analyse the rigid body in equilibrium

CO3-Evaluate the properties of surfaces and solids

CO4-Determine the friction and the effects by the laws of friction

CO5-Calculate dynamic forces exerted in rigid body

Lesson Plan

Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC / etc)	Blooms Level (L1-L6)	CO	PO
UNIT I - STATICS OF PARTICLES							
1	Fundamental Concepts and Principles, Systems of Units, Method of Problem Solutions	T1	1	BB/NPTEL	L1,L2	CO1	PO1,2,3,12
2	Statics of Particles - Forces in a Plane	T1	1	BB/NPTEL	L3	CO1	PO1,2,3,12
3	Resultant of Forces, Resolution of a Force into Components	T1	2	BB	L3	CO1	PO1,2,3,12
4	Rectangular Components of a Force, Unit Vectors	T1	1	BB	L2	CO1	PO1,2,3,12
5	Equilibrium of a Particle- Newton's First Law of Motion, Space	T1	1	BB/NPTEL	L3	CO1	PO1,2,3,12
6	Free-Body Diagrams, Forces in Space	T1	2	BB	L3	CO1	PO1,2,3,12
7	Equilibrium of a Particle in Space	T1	1	BB	L3	CO1	PO1,2,3,12

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any
*Assignment

Evaluation method
*Answers are evaluated based on paper sheets

UNIT –II   EQUILIBRIUM OF RIGID BODIES

8	Principle of Transmissibility, Equivalent Forces, Vector Product of Two Vectors	T1	1	BB	L1,L2	CO2	PO1,2,3,12
9	Moment of a Force about a Point, Varignon's Theorem	T1	1	BB	L2	CO2	PO1,2,3,12
10	Rectangular Components of the Moment of a Force, Scalar Product of Two Vectors	T1	1	BB	L3	CO2	PO1,2,3,12
11	Mixed Triple Product of Three Vectors	T1	1	BB	L2	CO2	PO1,2,3,12
12	Moment of a Force about an Axis, Couple - Moment of a Couple, Equivalent Couples, Addition of Couples	T1	2	BB	L3	CO2	PO1,2,3,12
13	Resolution of a Given Force into a Force -Couple system, Further Reduction of a System of Forces	T1	1	BB	L3	CO2	PO1,2,3,12
14	Equilibrium in Two and Three Dimensions - Reactions at Supports and Connections	T1	2	BB	L3	CO2	PO1,2,3,12

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any
*Assignment

Evaluation method
*Answers are evaluated based on paper sheets

UNIT III- DISTRIBUTED FORCES

15	Centroids of lines and areas – symmetrical and unsymmetrical shapes,	T1	1	BB	L1,L2	CO3	PO1,2,3,12
16	Determination of Centroids by Integration, Theorems of Pappus-Guldinus,	T1	1	BB	L2	CO3	PO1,2,3,12
17	Distributed Loads on Beams, Centre of Gravity of a ThreeDimensional Body	T1	1	BB	L2	CO3	PO1,2,3,12
18	Centroid of a Volume, Composite Bodies, Determination of Centroids of Volumes by	T1	1	BB	L3	CO3	PO1,2,3,12
19	Moments of Inertia of Areas and Mass - Determination of the Moment of Inertia of an Area by Integration, Polar Moment of Inertia	T1	2	BB	L3	CO3	PO1,2,3,12
20	Radius of Gyration of an Area, Parallel-Axis Theorem, Moments of Inertia of Composite Areas,	T1	1	BB	L3	CO3	PO1,2,3,12
21	Moments of Inertia of a Mass - Moments of Inertia of Thin Plates	T1	1	BB	L3	CO3	PO1,2,3,12
22	Determination of the Moment of Inertia of a Three-Dimensional Body by Integration	T1	1	BB	L3	CO3	PO1,2,3,12

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any
*Case Study

Evaluation method
*Answers are evaluated based on paper sheets

UNIT IV- FRICTION

23	The Laws of Dry Friction,	T1	2	BB	L1,L2,L3	CO4	PO1,2,3,12
24	Coefficients of Friction	T1	1	BB	L2,L3	CO4	PO1,2,3,12
25	Angles of Friction, Wedge friction	T1	2	BB	L3	CO4	PO1,2,3,12
26	Wheel Friction	T1	1	BB	L3	CO4	PO1,2,3,12
27	Rolling Resistance	T1	1	BB	L3	CO4	PO1,2,3,12
28	Ladder friction	T1	2	BB	L3	CO4	PO1,2,3,12

	Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any *Tutorial						

	Evaluation method *Answers are evaluated based on paper sheets						

UNIT-V DYNAMICS OF PARTICLES

29	Kinematics - Rectilinear Motion	T1	1	BB	L2	CO5	PO1,2,3,12
30	Curvilinear Motion of Particles	T1	1	BB	L2	CO5	PO1,2,3,12
31	Kinetics- Newton's Second Law of Motion	T1	1	BB	L3	CO5	PO1,2,3,12
32	Equations of Motions, Dynamic Equilibrium	T1	1	BB	L1,L2	CO5	PO1,2,3,12
33	Energy and Momentum Methods	T1	1	BB	L2,L3	CO5	PO1,2,3,12
34	Work of a Force, Kinetic Energy of a Particle	T1	1	BB	L2,L3	CO5	PO1,2,3,12
35	Principle of Work and Energy	T1	2	BB	L2,L3	CO5	PO1,2,3,12
36	Principle of Impulse and Momentum, Impact of bodies	T1	1	BB	L2,L3	CO5	PO1,2,3,12

Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any
*MCQ

Evaluation method
*Answers are evaluated based on Google forms / test papers

Content Beyond the Syllabus Planned

1	Belt Friction and Rope Friction
2	Moment of a couple in space

Text Books

1	Vela Murali, ―Engineering Mechanics‖, Oxford University Press (2010)
2	Beer, F.P and Johnston Jr. E.R., ―Vector Mechanics for Engineers: Statics and Dynamics,Tata McGraw-Hill Publishing company, New Delhi (2004).

Reference Books

1	Boresi P and Schmidt J, Engineering Mechanics: Statics and Dynamics, 1/e, Cengage learning, 2008
2	Irving H. Shames, Krishna Mohana Rao G, Engineering Mechanics – Statics and Dynamics, 4thEdition, Pearson Education Asia Pvt. Ltd., 2005
3	Hibbeller, R.C and Ashok Gupta, ―Engineering Mechanics: Statics and Dynamics‖, 11th Edition, Pearson Education 2010

Website / URL References

1	https://nptel.ac.in/courses/112/103/112103109/

Blooms Level

Level 1 (L1) : Remembering	Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing		Higher Order Thinking	Projects / Mini Projects
Level 2 (L2) : Understanding			Level 5 (L5) : Evaluating			
Level 3 (L3) : Applying			Level 6 (L6) : Creating			

Mapping syllabus with Bloom's Taxonomy LOT and HOT

Unit No	Unit Name	L1	L2	L3	L4	L5	L6	LOT	HOT	Total
Unit 1	STATICS OF PARTICLES	1	2	5				8	0	8

Unit 2	EQUILIBRIUM OF RIGID BODIES	1	3	4				8	0	8
Unit 3	PROPERTIES OF SURFACES AND SOLIDS	1	3	5				9	0	9
Unit 4	FRICTION	1	2	6				9	0	9
Unit 5	DYNAMICS OF PARTICLE	1	7	5				13	0	13
Total		5	17	25		0	0	47	0	47
Total Percentage		10.6383	36.1702	53.1915	0	0	0	100	0	100

CO PO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	1									1	2	
CO2	3	2	1									1	2	
CO3	3	2	1									1	2	
CO4	3	2	1									1	2	
CO5	3	2	1									1	2	
Avg	3	2	1									1	2	

Justification for CO-PO mapping

CO1	PO1: Basic engineering knowledge agreed strongly PO2: Identification of Engineering complex problems agreed moderatly PO3: Getting solutions for complex design problems agreed lowerly PO12: Recognise and preparation of things for life long learning agreed lowerely
CO2	PO1: Basic engineering knowledge agreed strongly PO2: Identification of Engineering complex problems agreed moderatly PO3: Getting solutions for complex design problems agreed lowerly PO12: Recognise and preparation of things for life long learning agreed lowerely
CO3	PO1: Basic engineering knowledge agreed strongly PO2: Identification of Engineering complex problems agreed moderatly PO3: Getting solutions for complex design problems agreed lowerly PO12: Recognise and preparation of things for life long learning agreed lowerely
CO4	PO1: Basic engineering knowledge agreed strongly PO2: Identification of Engineering complex problems agreed moderatly PO3: Getting solutions for complex design problems agreed lowerly PO12: Recognise and preparation of things for life long learning agreed lowerely
CO5	PO1: Basic engineering knowledge agreed strongly PO2: Identification of Engineering complex problems agreed moderatly PO3: Getting solutions for complex design problems agreed lowerly PO12: Recognise and preparation of things for life long learning agreed lowerely

3	High level	2	Moderate level	1	Low level

Name & Sign of Faculty Incharge : Mr.Mohan S R

Name & Sign of Subject Expert   : Dr. G Ramesh

Head of the Department   : Dr. Shunmugasundaram M

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