

## CORE PAPER – XII – DYNAMICS

Semester	Subject Code	Category	Lecture		Theory		Practical	Credits
VI	21CM A6B	Core paper – XII	Hrs/week	Hrs/Sem	Hrs/week	Hrs/Sem	0	4
			5	75	5	75		

### COURSE OBJECTIVES:

The students will be able to

- Understand the concepts of Kinematics, Simple Harmonic Motion, Projectiles, Central orbits and Moment of inertia.
- Enhance the mathematical maturity and provide model for some real life problems

### COURSE OUTCOMES:

On the successful completion of the course, the students will be able to

CO Number	CO Statement	Knowledge Level (K1-K4)
CO1	Acquire the knowledge about resultant and relative velocity	K2
CO2	Understand the terms projectile, trajectory and range	K2
CO3	Construct the mathematical equations for Simple Harmonic Motion	K3
CO4	Apply the concept of central orbit and Kepler's Laws of planetary motion problems in real life	K3
CO5	Determine the moment of inertia of simple geometric shapes	K3

*Knowledge Level: K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze*

### MAPPING WITH PROGRAMME OUTCOMES:

Cos	PO1	PO2	PO3	PO4	PO5	PO6
CO1	S	S	S	S	M	M
CO2	S	S	S	M	S	S
CO3	S	S	S	M	S	M
CO4	S	M	S	M	M	S
CO5	S	S	S	S	M	S

S- Strong; M- Medium; L- Low

**UNIT –I- KINEMATICS****15 Hours**

Velocity–Resultant velocity – Relative velocity – Acceleration – Rectilinear motion – Rectilinear Motion with a Constant Acceleration – Velocity and Acceleration in a coplanar motion – Angular Velocity – Relative Angular Velocity – Problems.

(Chapter 1: Sections 1.1 – 1.4)

**UNIT –II- PROJECTILE****15 Hours**

Force on a Projectile – Nature of trajectory – Results pertaining to the Motion of Projectile – maximum Horizontal range for a given Speed and Range – Projectile projected horizontally - Projectile projected on an inclined plane - Maximum range on an inclined Plane - Problems.

(Chapter 13: Sections 13.1 – 13.2)

**UNIT- III- RECTILINEAR MOTION UNDER VARYING FORCE****15 Hours**

Simple Harmonic motion along a Horizontal line –Simple Harmonic motion along a vertical line. Impact-Direct oblique of two smooth spheres- Impulse of kinetic energy due to impact – Simple Problems.

(Chapter 12: Sections 12.1 – 12.3, Chapter 14: Sections 14.1 – 14.5)

**UNIT-IV-CENTRAL ORBIT****15 Hours**

Central Force and Central Orbit-Equation of a central orbit - Law of force and speed for a given orbit-Method to find central orbit-conic as a central orbit-Kepler's Laws of planetary motion, Problems.

(Chapter 16: Sections 16.1 – 16.3)

**UNIT-V-MOMENT OF INERTIA****15 Hours**

Theorems of parallel and perpendicular axis-Moment of Inertia of rod, triangular lamina, circular lamina, elliptic lamina, circular ring, right circular cone and sphere (hollow and solid), Problems.

(Chapter 17: Section 17.1)

**DISTRIBUTION OF MARKS: THEORY 30% AND PROBLEMS 70%**

**TEXT BOOK**

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	P. Duraipandian, LaxmiDuraipandian and MuthamizhJayapragasam	Mechanics	S. Chand & Co. New Delhi	2006

**REFERENCE BOOKS**

S.NO	AUTHORS	TITLE	PUBLISHERS	YEAR OF PUBLICATION
1.	A.V.Dharmapadam	Mechanics	S. Viswanathan and Co,Chennai	1991
2.	S.L. Loney	Elements of Dynamics	Macmillian India, Delhi	1982
3.	M.K. Venkataraman	Dynamics	Agasthier Book Depot, Trichy	1990

**WEB RESOURCES**

1. <https://revisionmaths.com/advanced-level-maths-revision/mechanics/projectiles>
2. <https://dynref.engr.illinois.edu/rem.html>

**TEACHING METHODOLOGY**

1. Class room Teaching
2. Assignments
3. Seminars
4. Discussions
- 5 .PPT Presentations

**SYLLABUS DESIGNER**

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