

22BEAS205 THEORY OF MACHINES

Hours Per Week :

L	T	P	C
1	2	0	2

PREREQUISITE KNOWLEDGE: Knowledge of Engineering Mechanics and Basic Engineering Mathematics.

COURSE DESCRIPTION AND OBJECTIVES:

The course provides the foundation to analyze the displacement, velocity and acceleration and the forces required for the proper design of mechanisms.

MODULE-1

UNIT-1

4L+8T+0P=12 Hours

MACHINE AND MECHANISM: Elements, links, pairs, kinematics chain, and mechanisms. Classification of pairs and mechanisms. Lower and higher pairs. Four bar chain, slider crank chain and their inversions.

UNIT-2

4L+8T+0P=12 Hours

GEARS AND GEAR TRAINS: ATypes of gears. Law of gearing, velocity of sliding between two teeth in mesh. Involute and cycloidal profile for gear teeth. Spur gear, nomenclature, interference and undercutting. Introduction to helical, spiral, bevel and worm gear. Simple, compound, reverted, and epicyclic trains. Determining velocity ratio by tabular method.

MODULE-2

UNIT-1

4L+8T+0P=12 Hours

FLYWHEEL AND BELT DRIVES: Turning moment diagrams, coefficient of fluctuation of speed and energy, weight of flywheel, flywheel applications.

Belt drives, types of drives, belt materials. Length of belt, power transmitted, velocity ratio, belt, size for flat and V belts. Effect of centrifugal tension, creep and slip-on power transmission

UNIT-2

4L+8T+0P=14 Hours

GOVERNORS AND BEARINGS: Types of governors. Constructional details and analysis of Watt, Porter, Proell governors. Effect of friction, controlling force curves. Sensitiveness, stability, hunting, iso-chronism, power and effort of a governor.

Friction of pivots and collars. Single disc, multiple disc, and cone clutches. Rolling friction, anti-friction bearings.



Source: <https://ourmechanicalengg.files.wordpress.com/2016/04/06.jpg>

SKILLS:

- ✓ Analyzing inversions of mechanisms.
- ✓ Demonstrate application of governors in controlling speed.

COURSE OUTCOMES:

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Design and optimize mechanisms to perform a specified task.	Apply	1	1, 2, 3, 4, 9, 12
2	Effectively present written, oral, and graphical solutions to design problems.	Apply	2	1, 2, 3, 9, 12
3	Work cooperatively in teams in the improvement of mechanism design.	Apply	2	1, 9, 10, 1, 12
4	Analyze the dynamic characteristics of mechanisms such as linkage, gears, and cams	Analyze	1 & 2	1, 2, 3, 9, 12

TEXT BOOKS:

1. Theory of Machines. Tata McGraw Hill Publishing Co. Ltd., , New Delh. 2020.
2. Khurmi R S and Gupta J K. . Theory of Machines. Eurasia Publishing House Pvt. Ltd., New Delhi. 2019.

REFERENCE BOOKS:

1. Bevan Thomas. "Theory of Machines" CBS Publishers and Distributors, Delhi 1984.
2. Rao J S and Dukkippatti R V. "Mechanisms and Machine Theory" Wiley eastern Ltd., New Delhi. 1990.