

# 19AG206 THEORY OF MACHINES

Hours Per Week :

L	T	P	C
2	0	0	2

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
30	-	-	2	30	2	5	2	2



Source :

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

## COURSE DESCRIPTION AND OBJECTIVES:

To analyze the motions of mechanisms, design a mechanism for given motions and to analyse forces in machines. To develop an ability to design a system, component, or process to meet desired needs within realistic constraints. To develop an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

## COURSE OUTCOMES:

Upon completion of the course, student will able to achieve the following outcomes:

COs	Course Outcomes	POs
1	Understand the fundamentals of the theory of kinematics and dynamics of machines.	---
2	Analyze the motion and the dynamic forces acting on mechanical systems composed of linkages and gears.	1,2
3	Apply linkage, belt, and gear mechanisms for a given motion or a given input/output motion.	1,3,5
4	Creative applications of all the areas in day to day life.	2

## SKILLS:

- ✓ Identify common mechanisms used in machines and their applications.
- ✓ Simulate various mechanisms using various modeling techniques.
- ✓ Determine degree of freedom of mechanisms.
- ✓ Balancing of static and dynamic system.

**UNIT - I** **L-06**

Introduction to Mechanisms: 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. Determination of velocity and acceleration using graphical (Relative velocity and acceleration) method. Instantaneous centers.

**UNIT -II** **L-06**

Gears and Gear Trains: Types 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.

**UNIT - III** **L-06**

Friction: Types of friction, Static and Dynamic laws of dry friction. Friction of pivot and collar bearings. Single disc, multiple disc and cone clutches. Belt and chain drives: Types of belt drive, belt materials. Length of open belt and cross belt, velocity ratio, power transmitted, angle of contact, belt size for flat and V belts. Effect of centrifugal tension, creep and slip on power transmission. Chain drives, Advantages and disadvantages of chain drives over belt drive, Relation between pitch and pitch circle diameter, Relation between chain speed and angular speed of sprocket.

**UNIT - IV** **L-06**

Governors: Introduction Types of governors. Centrifugal governors, Terms used in governors, Constructional details and analysis of Watt, Porter and Proell governors. Effect of friction, controlling force curves. Sensitiveness, stability, hunting, isochronism, power and effort of a governor.

**UNIT - V** **L-06**

Turning moment diagrams and Flywheel: Turning moment diagram for a single cylinder double acting steam engine, four stroke internal combustion engine, multi-cylinder engine. Fluctuation of energy, Maximum fluctuation of energy, Coefficient of fluctuation of energy and speed. Weight of flywheel, Flywheel applications.

**TEXT BOOK :**

1. Rattan S.B. 2017, "Theory of Machines", Tata McGraw Hill Publishing Co. Ltd. New Delhi.

**REFERENCE BOOKS :**

1. Khurmi R. S and Gupta J.K. 2005, "Theory of Machines". S. Chand & Co. Ltd. New Delhi.
2. Bevan Thomas, 2004, "Theory of Machines". CBS Publishers and Distributors, Delhi.
3. Rao J. S and Dukkippatti R.V. 2007, "Mechanisms and Machine Theory". Wiley astern Ltd. New Delhi.
4. Shigley J. E 2009, "Theory of Machines", Oxford Publishers.