

# 19AE204 THEORY OF MACHINES

Hours Per Week :

L	T	P	C
3	0	0	3

Total Hours :

L	T	P	CS	WA/RA	SSH	SA	S	BS
45	-	-	5	5	30	20	5	5



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## COURSE DESCRIPTION AND OBJECTIVES:

This course mainly deals with the concepts of mechanisms and machines that are commonly deployed in industries. The objective of this course is to strengthen the students in designing of mechanisms and analyzing the forces acting on various machine components during operation through simulation and hands on experience.

## COURSE OUTCOMES:

Upon completion of the course, the students will be able to achieve the following outcomes

COs	Course Outcomes	POs
1	Understand the mechanisms that are commonly used in machineries.	1,10
2	Apply the knowledge to calculate the gyroscopic effect in automobiles, ships and aeroplanes.	1,9,10
3	Analyze and balance the dynamic forces acting on engine and machine components.	2,9
4	Determine natural frequency of machine components.	3,9,10

## SKILLS:

- ✓ Compute velocity and acceleration of at different points on links in mechanisms.
- ✓ Evaluate inertia forces on a moving machine component.
- ✓ Calculate the mass required for balancing of rotating and reciprocating machine components.
- ✓ Identify resonance frequency of a single degree of freedom system.

**UNIT - I****L-9**

**MECHANISMS:** Introduction, classification of kinematic chains, inversion of four bar mechanism, Davis & Ackerman steering gear mechanisms and their applications

**UNIT - II****L-9****CAMS AND GEARS:**

**CAMS:** Introduction to cams, Cam profile generation for uniform velocity, uniform acceleration and simple harmonic motion

**UNIT - III****L-9**

**GEAR AND GEAR TRAINS:** Gear nomenclature, expression for arc and path of contact, condition for avoiding interference, simple, compound, reverted and epicyclic gear train and their applications.

**UNIT - IV****L-9**

**BRAKES :** Introduction, materials for Brakes, types of brakes: single block, pivoted block, double block, simple band brake, differential band brake, breaking of vehicle.

**UNIT - V****L-9**

**BELT :** Introduction, types of belts, types of flat belt drive, velocity ratio of belt drive, slip of belt drive, length of open and cross belt drive, power transmitted by belt, ratio of driving tensions for flat belt drive, centrifugal tension.

**TEXT BOOKS :**

1. R. S. Khurmi and J. K. Gupta, Theory of Machines, 15<sup>th</sup> Edition, S. Chand Publication, New Delhi, 2010.
2. S. S. Rattan, Theory of Machine, 3<sup>rd</sup> Edition, Tata McGraw Hill, New Delhi, 2017.

**REFERENCES BOOKS :**

1. Fundamentals of Kinematics and Dynamics of Machines and Mechanisms, Oleg Vinogradov, CRC Press, 2000 edition.
2. Sadhu singh Theory of Machine –Pearson publications,2006.