

Course Type	Course Code	Name of Course	L	T	P	Credit
DC	MEC 201	Kinematics of Machines	3	0	0	9

Course Objective

- to learn how to analyze the motions of mechanisms, design mechanisms to have given motions, and analyze forces in machines.
- To understand the operating principles of different parts of mechanical system gears, gear trains, cams and linkages.
- To provide a foundation for the study of machine design and for interpretation of computer-aided design and analysis data.

Learning Outcomes

Upon successful completion of this course, students will:

- have a broad understanding of different mechanism, motion of machines.
- have an understanding about degree of freedom of a mechanical system.
- be able to find velocity and acceleration of kinematic pair if input is known to a mechanical system.
- have a broad understanding about designing part of different mechanical system like gear, cam, break, clutch etc.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Kinematic pairs, inversion, mobility and range of movements, degree of freedom, equivalent mechanism.	6	Understanding of kinematics of motion, degree of freedom of a mechanism.
2	Displacement, velocity analysis, I-Centre method: angular velocity ratio theorem	5	Understanding of linear velocity and numerical to solve velocity of different kinematic pair in a mechanism.
3	Acceleration analysis of planar linkages, Coriolis acceleration component	6	Understanding of acceleration and numerical to solve acceleration of different kinematic pair in a mechanism.
4	Lower pairs: Simple Mechanism: Pantograph, Straight-line mechanisms, Engine Indicators, Automobile steering gears: Devis and Ackermann steering mechanisms, Hooke joint. Mechanical Couplings	6	Understanding of different lower pair mechanism, their dimensional synthesis for motion.
5	Higher Pairs: Types of Cam, Types of follower, Follower motion: Velocity and Acceleration, Layout of Cam profiles.	5	Understanding of different types of cam and follower movement and their applications. Design of a cam for a certain motion outcome.
6	Higher Pairs: Types of gears, Gear terminology, Law of Gearing, motion and synthesis of simple gear, Gear Train: Simple, compound, reverted and planetary gear trains.	6	Understanding of different types of gear and gear train mechanism and their applications.
7	Brakes: Types, Analysis, Dynamometers	5	Understanding of different types of break and dynamometer and their applications.
8	Clutches: Types, Analysis.	3	Understanding of different types of clutch and their applications.

Text Books:

1. Theory of Machines-S.S.Rattan

Reference Books:

1. Theory of Machines and Mechanisms-John Uicker, Gordon Pennock, Joseph Shigley
2. Theory of Machines-Khurmi and Gupta