

Course Syllabus – Fall/First 2018 Theory of Machines (TOM) (12210347)

Department of mechanical Engineering

Meetings: Tu. Th., 8-9, 9-10 AM

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Course description & Objective:

Theory of Machines is a fundamental course for production and manufacturing engineers to understand the working principals of any machine. This course is essential to understand the motion transmission between various machine components.

Course Outcome

1. Students will understand the fundamentals related to kinematics of mechanisms and machines.
2. Students will be able to synthesize and analyze the mechanisms.
3. Students will be able to understand the fundamentals of machine components like belt, gear, brake, and clutch.

Text Required: Norton, Robert. Design of Machinery, 3rd ed.

Grading Policy:

Two exams @ 20% /each

Final exam: 30%

Laboratory: 30%

Subjects outline

Basics of Mechanisms and Machines:

Types of Motion, Links, Kinematic Pair, Types of Joints, Degree of Freedom, Classification of Kinematic Pairs, Kinematic Chain, Linkage, Mechanism and Structure, Inversions of Four-bar and Slider Crank Mechanism, Mobility of Mechanisms, Transmission Angle

Position, Velocity, and Acceleration Analysis of Mechanisms

Absolute and Relative Motion, Velocity and Acceleration Diagrams for four bar and six bar mechanisms, Velocity by Instantaneous Centre Method, Coriolis Acceleration.

Kinematic Synthesis of Mechanisms

Number Synthesis, Stages of Kinematic Synthesis and Errors, Two and Three Position Synthesis of Four Bar and Slider Crank Mechanisms

Gears and Gear Trains

Classification of Gears, Gear Terminology, Law of Gearing, Velocity of sliding, Gear Teeth Profile, Path of Contact, Arc of Contact, Contact Ratio, Interference of in Involute Gears, Minimum Number of Teeth, Undercutting, Gear Forces, Different Types of Gear Trains, Analysis of Epicyclic Gear Train

Cams

Types of Cams and Followers, Cam Terminology, Derivatives of Follower Motion, Cam Profile Layout