

Course code	Course Name	L-T-P - Credits	Year of Introduction
ME214	Theory of Machines	4-0-0-4	2016
Prerequisite : Nil			
Course Objectives <ul style="list-style-type: none"> To impart basic knowledge on kinematics of mechanisms and machines. To understand kinematic synthesis of mechanisms. To analyse the motion resulting from a specified set of linkages in a mechanism. To study the principles involved in assessing the displacement, velocity and acceleration at any point in a link of a mechanism. To study the application of friction in different devices. To study the power transmission devices 			
Syllabus Kinematics – velocity and acceleration- Friction – Brakes – Gear – Cams- Gyroscope - Flywheel Governors- Static and dynamic balancing - Vibration			
Expected outcome. <ul style="list-style-type: none"> After the course, students will understand the various aspects of mechanisms and machines and will be able to solve design problems in the area of mechanisms and machines. 			
Text Books <ol style="list-style-type: none"> P L Ballaney, Theory of Machines and Mechanisms, Khanna Publishers S S. Rattan-Theory of machines, McGraw Hill 			
References: <ol style="list-style-type: none"> J. E. Shigley and J.J Uicker, Theory of Machines and Mechanisms, McGraw–Hill. T. Bevan T., Theory of Machines- A Text Book for Engineering Students, Pearson. Wilson C. E. and J. P. Sadler, Kinematics and Dynamics of Machinery, Pearson. Ambekar A. G., Mechanism and Machine Theory, PHI Learning. Gosh A. and A. K. Mallick, Theory of Machines and Mechanisms, Affiliated East West Press. V.P. Singh, Theory of machines, Dhanpat Rai. 			
Course Plan			
Module	Contents	Hours	Sem.ExamMarks
I	Kinematics - links, mechanism, Degrees of freedom, Grashoff's law, four-bar chain, Slider crank chain, inversions and practical applications. Automobile steering mechanisms: Davis and Ackermann steering mechanisms. Velocity and acceleration diagrams of simple mechanisms. Coriolis acceleration (Theory only). Friction - Pressure and wear theories, pivot and collar friction, Single and multiple disc clutches..	10	15%

II	Brakes - block and band brakes, self energizing and self-locking in braking. Gear – Different types of gears- Nomenclature of spur and helical gears, Law of gearing, Gear trains - Simple, compound gear trains and epicyclic gear trains.	9	15%
FIRST INTERNAL EXAMINATION			
III	Cams - types of cams, cam profiles for knife edged and roller followers with and without offsets for SHM, constant acceleration-deceleration, constant velocity and cycloidal motion.	8	15%
IV	Gyroscope –Gyroscopic torque, gyroscopic stabilization of ships and aeroplanes. Flywheel - Turning moment diagrams, fluctuation of energy.	8	15%
SECOND INTERNAL EXAMINATION			
V	Governors - types of governors, simple watt governor - Porter, Proell governors-. Isochronisms, hunting, sensitivity and stability. Hartnell governor. Static and dynamic balancing of rotating mass- Single and several masses in different planes, balancing of reciprocating mass, Dynamic analysis of slider crank mechanism.	10	20%
VI	Vibration - kinematics of vibrating motion, vibration systems having single degree of freedom, free and force vibration, damped vibration. Torsional vibrations -Transverse vibration. whirling of shaft (Description only).	9	20%
END SEMESTER EXAM			

Question Paper Pattern

Maximum marks: 100,

Exam duration: 3 hrs

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed.