Department of Mechanical Engineering

MECHANICS OF MACHINERY

Course Code	19ME3502	Year	III	Semester	I
Course Category	Program Core	Branch	ME	Course Type	Theory
Credits	4	L – T – P	3 – 1 – 0	Prerequisites	Nil
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes		Levels
After successful completion of the course, the student will be able to		
CO1	Illustrate the elementary mechanisms and kinematic inversions of simple mechanisms	L2
CO2	Calculate the velocity and accelerations of various links and points in the mechanisms	L3
CO3	Construct the cam profile for a given motion and perform kinematics of gears and gear trains	L3
CO4	Perform balancing for rotating and reciprocating parts and estimate the effect of gyroscopic couple on aeroplanes and ships	L3
CO5	Demonstrate the operation of flywheel and governors.	L3

Contribution of Course Outcomes towards achievement of Program Outcomes &													
Strength of correlations (3-High, 2: Medium, 1: Low)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3									2	3	1
CO2	3	3	3							2		2	3	1
CO3	3	3	3							2		2	3	1
CO4	3	3	3									2	3	1
CO5	3	3	3									2	3	1

Syllabus		
Unit No.	Contents	Mapped COs
I	**SIMPLE MECHANISMS**: Classification of mechanisms – Basic kinematic concepts and definitions – Degrees of freedom, mobility – Grashof's law, kinematic inversions of four bar chain, single slider and double slider crank chains	CO1
II	**VELOCITY AND ACCELERATION IN MECHANISMS**: Velocity analysis of simple mechanisms by Instantaneous centre method, relative velocity method (graphical method), Kennedy's theorem. Acceleration analysis of simple mechanisms - Slider crank mechanism, Coriolis component of acceleration, crank and slotted lever mechanism.	CO2
III	**GEARS AND GEAR TRAINS**: Classification of Gears, gear terminology, fundamental law of gearing, Involute and cycloidal gear profiles, spur gear contact ratio and interference/undercutting, Gear trains - Simple, compound, reverted and epicyclic gear train	CO3

	CAMS: Classification of cams and followers- Terminology and definitions-Displacement diagrams- Uniform velocity, simple harmonic and uniform acceleration and retardation, Design of cam profiles (knife edge and roller followers).	
IV	**BALANCING OF ROTATING AND RECIPROCATING MASSES**: Need for balancing, static and dynamic balancing, balancing of single mass and several masses in different planes. Balancing of reciprocating masses and inline multicylinder engines. **GYROSCOPE**: Principle of gyroscope, gyroscopic effect in an aeroplane and ship.	CO4
V	**FLYWHEELS**: Introduction, Turning moment diagram for Multi cylinder Engine, Fluctuation of energy. Coefficient of fluctuation of Speed, Energy Stored in a Flywheel, Flywheel in Punching Press **GOVERNORS**: Introduction, Watt, Porter, Proell Governors, Hartnell, Hartung Governors, Sensitiveness of a Governor, Hunting, Isochronisms, Stability, Controlling Force Diagrams	CO5

Learning Recourse(s)
Text Books
1. S.S.Rattan, Theory of Machines, 4/e, Tata Mc-Graw Hill, 2014
Reference Books
1. F. Haidery, Dynamics of Machines, 5/e, Nirali Prakashan, Pune, 2003 2. J.E.Shigley, Theory of Machines and Mechanisms, 4/e, Oxford, 2014 3. P.L.Ballaney, Theory of Machines & Mechanisms, 25/e, Khanna Publishers, Delhi, 2003. 4.   Norton, R.L., Design of Machinery - An introduction to Synthesis and Analysis of Mechanisms and Machines,2/e, McGraw Hill, New York, 2000.
e- Resources & other digital material
1. https://nptel.ac.in/courses/112/104/112104121/ 2. https://nptel.ac.in/courses/112/104/112104114/