

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Bachelor of Technology			Branch/Spec.		Mechatronics Engineering		
Semester		III			Version		1.0.0.0		
Effective from Academic Year			2019-20		Effective form the batch Admitted in			July 2018	
Subject code		2ME3102		Subject Name		KINEMATICS OF MACHINES			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50
Pre-requisites:									
<ul style="list-style-type: none"> • Statics and Dynamics of Mechanics • Basics Mathematics 									
Learning Outcome:									
After learning this course, student should be able to:									
<ul style="list-style-type: none"> • Identify functional characteristics of various machine elements. • Construct the velocity and acceleration diagrams for particular mechanism. • Explain and construct the cam profile of different types with their importance. • Understand the fundamentals of gear trains, brakes and dynamometers. • Describe the effect of friction on mechanical elements. 									
Theory syllabus									
Unit	Content								Hrs
1	Links and Mechanisms: Introduction to mechanisms, definition, kinematics links, type of links, kinematics pairs, machine & structure, type of constrained motions, kinematics chain, type of joints in a chains, mechanisms, degree of freedoms, kutzbach & grumbler's criteria, single slider crank mechanisms, double slider crank mechanisms, four bar chin mechanisms, inversions. Introduction to lower pair mechanisms, pantograph, straight line mechanisms, exact straight line motion mechanisms made up of turning pairs (peaucellier, hart's), Oldham's coupling, Scott Russell's mechanisms, approximate straight line motion mechanisms (watts, grasshopper, Roberts), steering gear mechanisms, Davis steering gear mechanisms, Ackerman steering gear mechanisms.								12
2	Kinematic analysis of mechanisms: Introduction, motion of link, rectilinear and rotational motion in a plane, compound pendulum, equivalent dynamic system, velocity & acceleration in machine parts, instantaneous centre, Number of I centres, Arnold Kennedy theorem, centroid velocity and acceleration diagrams for mechanisms (vector and graphical approach).								8
3	Friction: - Type of Friction, Inclined Plane, Condition for Maximum Efficiency, Friction Circle, Friction Axis, Friction of Pivot & Collar Bearings for Uniform Pressure and Uniform Wear Condition.								6
4	Brakes & Dynamometer: Type of brakes, shoe brakes, band brake, band & block brakes, internal expanding shoe brake, effect of braking, braking of vehicle, type of dynamometers, prony brake, rope brake, belt transmission, beviess Gibson torsion dynamometer, hydraulic dynamometer.								6

5	Cams: Introduction, type of cams, type of followers, motion of the followers, displacement, velocity & acceleration of cam, construction of cam profile with knife edge, roller and flat faced reciprocating & oscillating followers.	6
6	Gear Train: Simple, compound, reverted and epicyclic gear train analysis of epicycles, sun & planet gear, torques in epicyclic trains, bevel epicyclic gear, differential gear box.	6
Practical content		
The practical work shall be based on experimental and analytical work on the topics mentioned above and will be defended by the candidates.		
Text Books		
1	S. S. Rattan, "Theory of machines", Tata McGraw-Hill Education, 3rd Edition.	
2	J.S. Rao and R. V. Dukkipatti, "Mechanisms & Machine Theory", New age international publication, 2 nd Edition.	
Reference Books		
1	C. S. Sharma, Kamlesh Purohit, "Theory of Mechanisms and Machines", PHI Learning Pvt. Ltd., 2 nd Edition.	
2	Sadhu Singh. "Theory of Machines", Pearson publication, 3 rd Edition.	
ICT/MOOCs references		
1	https://nptel.ac.in/courses/112104121/18	
2	http://www.nptelvideos.in/2012/12/kinematics-of-machines.html	
3	https://engineeringvideolectures.com/course/823	