

Department of Mechanical Engineering
Lesson Plan

Name of the Subject :Kinematics Of Machinery (14BT40301)

Class& Semester :IIB. Tech. – II Semester

Name of the faculty Member :K VINOD KUMAR

S. No.	Topic	No. of periods	Book(s) followed	Topics for self-study
UNIT – I: MECHANISMS AND MACHINES				
1	Elements or links, classification: Rigid, Flexible and Fluid link	1	T1	Visit http://www.engineeringvideos.org/mechanisms Go through all the mechanisms
2	Types of Kinematic pairs: Sliding, Turning, Rolling, Screw and Spherical Pairs	1	T1	
3	Lower and Higher pairs; Closed and Open pairs;	1	T1	
4	Constrained motions: Completely, Partially or successfully and incompletely constrained motions	1	T1&T2	
5	Classification of machines; Kinematic chain; Types of joints: Binary, Ternary and Quaternary joints	1	T1 & T2	
6	Number of degree of freedom for plane mechanisms and its applications	1	T1 & R1	
7	Kutzbach and Grubler's criterions	1	T1, R1, & R2	
8	Inversion of mechanisms: Quadric cycle, Single slider and Double slider crank chains.	1	T1, R1, & R2	
Total periods required:		8		
UNIT – II: VELOCITY AND ACCELERATION ANALYSIS				
9	Instantaneous center of rotation; Centroids and axodes	1	T1 & T2	Read definition and units of velocity and acceleration.
10	Relative motion between two bodies; Aronhold Kennedy (three center in line) theorem;	1	T1, T2 & R2	
11	method for determination of Instantaneous Centre	2	T1, T2 & R2	
12	Diagrams for simple mechanisms and determination of angular Velocity of links and linear velocities of point	1		
13	Velocity and acceleration diagrams	1		

14	Relative velocity method for four bar mechanism with revolute joint	1		
15	Slider-crank mechanism, and its inversions	1		
Total periods required:		8		
UNIT-III: MECHANISMS WITH LOWER PAIRS				
16	Pantograph	1	T1, T2 & R1	
17	Exact Straight Line Motion Mechanisms: Peaucellier, Hart and Scott Russell's mechanism	2	T1, T2 & R1	
18	Approximate Straight Line Motion Mechanisms: Watt's, Grasshopper, Tchebicheff's and Robert mechanisms	2	T1, T2 & R1	
19	Steering mechanisms: Conditions for correct steering; Davis Steering gear and Ackerman steering gear mechanisms	3	T1, T2 & R1	
20	Hooke's joint: Single and double Hooke's joint; universal coupling.	2	T1, T2 & R1	
Total periods required:		10		
UNIT – IV: CONSTRUCTION OF CAM PROFILE				
21	Introduction to cams and followers, their uses	1	T1 & T2	Time-varying Acceleration. 1D Kinematics- Acceleration Depends on Position. Project 12-1D in R2.
22	Types of followers and cams, terminology,	1	T1 & T2	
23	Types of follower motion for translating follower; uniform velocity; simple harmonic motion	2	T1 & T2	
24	Maximum velocity and maximum acceleration during outward and return stroke in the case of uniform velocity, SHM, and uniform acceleration and retardation	2		
25	Knife edge, Roller followers (axis of follower passes through the axis of cam shaft, and offset).	2		
Total periods required:		8		
UNIT – V: MECHANISMS WITH HIGHER PAIRS				
26	Friction wheels and toothed gears	1	T1, R1, & R2	
27	Law of gearing; condition for constant velocity ratio for transmission of motion	1	T1, R1, & R2	

28	Forms of teeth: cycloidal and involute profiles, Velocity of sliding	2	T1, R1, & R2	
29	Phenomena of interference; Condition for minimum number of teeth to avoid interference; Expressions for arc of contact and path of contact	3	T1, R1, & R2	
31	Gear trains: Introduction; types: simple, compound, reverted and epicyclic gear train;	2		
32	Train value; Methods of finding train value or velocity ratio; simple problems.	2		
Total periods required:		11		
Grand total periods required:		45		

TEXT BOOKS:

1. S. S. Rattan, Theory of Machines and Mechanisms, Tata McGraw Hill Education, Third Edition, 2009
2. R.S. Khurmi, Theory of machines, S.Chand Publications, Fourteenth Revised Edition, 2012

REFERENCE BOOKS:

1. Dr. R. K. Bansal, Dr. J. S. Brar , Theory of Machines, Laxmi Publications, Fourth Edition, 2013
2. Ballaney. P. L., Theory of Machines and Mechanisms, Khanna Publishers, 2005
3. Joseph Edward Shigley and John Joseph Uicker,Jr., Theory of Machines and Mechanisms, MGH, Third Edition, New York.
4. Bevan T, Theory of Machines, CBS Publishers and Distributors, New Delhi, 2002.