Hall Ticket Number:

Code No. : 14565 AS O

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (Mech. Engg.) IV-Semester Advanced Suppl. Examinations, Aug./Sept.-2023
Kinematics of Machines

Time: **3 hours**

Max. Marks: **60**

Note: Answer all questions from Part-A and any FIVE from Part-B

Part-A (10 × 2 = 20 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	Classify Kinematic links.	2	2	1	1
2.	What is an Inversion?	2	1	1	1
3.	Define Instantaneous center of velocity.	2	1	2	1
4.	What is Coriolis acceleration?	2	1	2	2
5.	List the applications of Hooke's joint	2	1	3	3
6.	Classify chains.	2	2	3	2
7.	Define base circle and prime circle in cams.	2	1	4	2
8.	Classify Followers.	2	2	4	3
9.	Classify Gears.	2	2	5	2
10.	Which gear train is used in clocks?	2	1	5	2

Part-B (5 × 8 = 40 Marks)

11. a)	Explain types of constrained motions.	4	1	1	1
b)	Sketch the Radial Cam and Roller Follower mechanism and find the degrees of freedom of it.	4	3	1	2
12.	List the Inversions of Four bar chain and explain them.	8	2	2	1

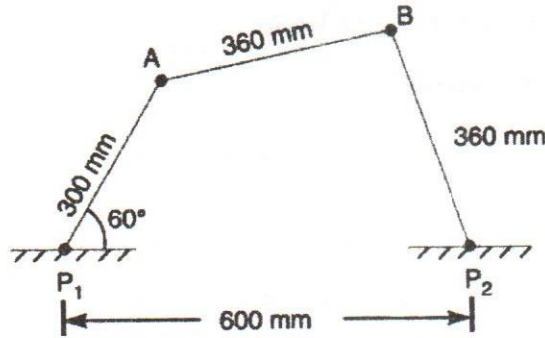|		M	L	CO	PO
13.	The dimensions and configuration of the four-bar mechanism, shown in Figure-1, are as follows: $P_1A = 300$ mm; $P_2B = 360$ mm; $AB = 360$ mm, and $P_1P_2 = 600$mm. The angle $AP_1P_2 = 60°$. The crank F_1A has an angular velocity of 10 rad/s and an angular acceleration of 30 rad/s^2, both clockwise. Determine the angular velocities and angular accelerations of P_2B, and AB and the velocity and acceleration of the joint B.	8	4	3	4

Fig.1

		M	L	CO	PO
14.	A cam is to be designed for a knife edge follower with the following data: 1. Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion. 2. Dwell for the next 30°. 3. During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion. 4. Dwell during the remaining 180°. Draw the profile of the cam when the line of stroke of the follower passes through the axis of the camshaft. The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent if the cam rotates at 240 rpm.	8	3	4	3
15. a)	Distinguish between cycloid and Involute gear profiles.	3	3	5	2
b)	A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with a 20° pressure angle, 12 mm module, and 10 mm addendum. Find the length of the path of contact, the arc of contact, and the contact ratio.	5	2	5	4
16. a)	List the Inversions of Four bar chain and explain them.	4	2	1	2
b)	Compare the Instantaneous center method and Velocity polygon method for velocity analysis of mechanisms.	4	3	2	2
17.	Answer any *two* of the following:				
a)	Explain the working of the Ackerman steering gear mechanism with a neat sketch.	4	3	3	1
b)	Discuss the SHM follower motion.	4	2	4	2
c)	Elaborate on the types of Gear trains.	4	4	5	3

M : Marks;   L: Bloom's Taxonomy Level;   CO; Course Outcome;   PO: Programme Outcome

i)	Blooms Taxonomy Level – 1	20%
ii)	Blooms Taxonomy Level – 2	36.25%
iii)	Blooms Taxonomy Level – 3 & 4	43.75%

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