VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD
Accredited by NAAC with A++ Grade
B.E. (Mech. Engg.) IV-Semester Advanced Supplementary Examinations, September-2022
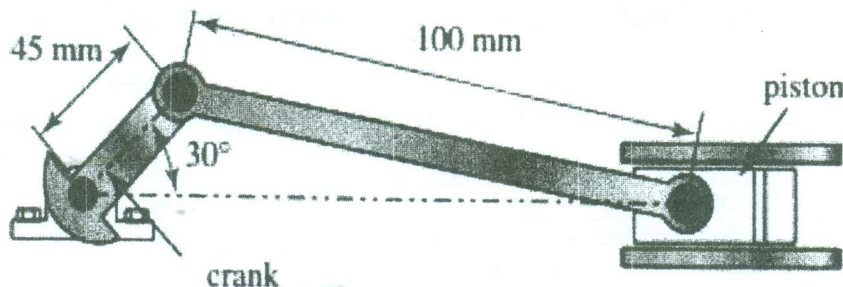## Kinematics of Machines

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.	How closed pair is different from open pair.	2	1	1	1
2.	What do you mean by Inversion of Mechanism?	2	1	1	1
3.	What is Instantaneous Centre of Rotation? What formula is used to find the number of instantaneous centers in a mechanism.	2	1	2	3
4.	What is centripetal component of acceleration and write the formula for finding it.	2	1	2	3
5.	What are the disadvantages of Davis steering gear mechanism?	2	1	3	2
6.	What is the effect of centrifugal tension over power transmission?	2	1	3	2
7.	Define base circle and pitch circle of cam.	2	1	4	1
8.	List the types of motions of followers.	2	1	4	1
9.	A spur gear has a module of 4 mm and the pitch line velocity of 2.51 m/s . The number of teeth on the gear is 40. Determine i. the speed of the gear and ii. The circular pitch.	2	2	5	3
10.	What is the advantage of compound gear train over simple gear train?	2	2	5	1

Part-B (5×8 = 40 Marks)

11. a)	Explain the types of Kinematic Pairs based on the nature of contact and nature of the mechanical constraint.	4	2	1	1
b)	List the inversions of a four bar chain and explain any one inversion of it.	4	2	1	1
12. a)	A slider crank mechanism at an instant is shown in Fig. The crank rotates at uniform speed of 300 rpm counter clock wise. Determine the linear acceleration of piston and angular acceleration of connecting rod?	4	4	2	3

			M	L	CO	PO
	b)	In a four bar chain ABCD, AD is fixed and 150mm long. The Crank AB is 40mm long & rotates at 120 rpm clockwise, while the link CD is 80mm long & oscillates about D. BC and AD are of equal length. Find the angular velocity of the link CD, when angle BAD = 60^0.	4	4	2	3
13.	a)	Two shafts are connected by a Hooke's joint. The driving shaft revolves uniformly at 500 rpm. If the total permissible variation in speed of the driven shaft is not to exceed ± 6% of the mean speed, find the greatest permissible angle between the centre lines of the shafts.	4	3	3	3
	b)	A shaft rotating at 200 rpm drives another shaft at 300 rpm and transmits 6 kW through a belt. The belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4m. The smaller pulley is 0.5 m in diameter. Calculate the stress in the belt, if it is i) an open belt drive, and ii) a cross belt drive. Take μ = 0.3.	4	3	3	4
14.		A cam is to give the following motion to a knife-edged follower : 1. Outstroke during 60° of cam rotation; 2. Dwell for the next 30° of cam rotation ; 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50 mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft,	8	4	4	4
15.	a)	The number of teeth on each of the two equal spur gears in mesh are 40. The teeth have 20° involute profile and the module is 6 mm. If the arc of contact is 1.75 times the circular pitch, find the addendum	4	3	5	3
	b)	Classify and explain gear trains with neat sketches.	4	2	5	1
16.	a)	Describe Whitworth's quick return mechanism with neat sketch.	4	2	1	1
	b)	What is coriolis component of acceleration? How is it determined?	4	2	2	2
17.		Answer any *two* of the following:				
	a)	Explain Ackerman steering gear mechanism.	4	2	3	1
	b)	Draw the displacement, velocity and acceleration diagrams for a follower when it moves with simple harmonic motion.	4	3	4	2
	c)	A pinion having 30 teeth drives a gear having 80 teeth. The profile of the gears is involute with 20° pressure angle, 12 mm module and 10 mm addendum. Find the length of path of contact, arc of contact and the contact ratio.	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	35%
iii)	Blooms Taxonomy Level – 3 & 4	45%

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