

Hall Ticket Number:

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Code No. : 14526

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (Mech. Engg. : CBCS) IV-Semester Main Examinations, January-2021
Kinematics of machines

Time: 2 hours

Max. Marks: 60

Note: Answer any NINE questions from Part-A and any THREE from Part-B

Part-A (9 × 2 = 18 Marks)

Q. No.	Stem of the question	M	L	CO	PO
1.	What is kinematic link? Classify kinematic links	2	1	1	1
2.	Differentiate between machine and structure.	2	2	1	1
3.	Build an example of mechanism involving Coriolis component of acceleration	2	3	2	2
4.	Calculate the number of instantaneous centers of slider – crank mechanism	2	2	2	2
5.	What is the condition for maximum power transmission of belts? Also express maximum velocity of belt.	2	2	3	2
6.	Interpret working of hook's joint with a sketch	2	2	3	2
7.	Construct displacement diagram for cycloidal motion of cam follower	2	3	4	2
8.	Elaborate types of cams and followers	2	2	4	2
9.	What is interference of gears?	2	1	5	2
10.	Classify gears	2	1	5	2
11.	Apply Kutbach criterion to any mechanism of your choice	2	2	1	2
12.	Locate the instantaneous centers of four bar mechanism	2	2	2	2
Part-B (3 × 14 = 42 Marks)					
13. a)	Explain in detail inversions of quadratic cycle chain	7	2	1	2
b)	Select any three mechanisms and show Grubler's criterion is satisfied	7	2	1	2
14. a)	In a slider crank mechanism the length of crank is 100 mm and connecting rod 400 mm. The center of Gravity, G of the connecting rod is at 175 mm from the slider. Angular velocity of crank is 500 r.p.m. When crank makes 30 degrees rotation from inner dead center calculate (a) velocity of slider (b) velocity of center of gravity of connecting rod G (c) Angular velocity of connecting rod.	10	4	2	2
b)	Show that Quick return mechanism involves Coriolis component of acceleration	4	3	2	2

Contd... 2

15. a)	Compare and contrast Davis and Ackerman steering gear mechanisms with necessary sketches.	6	2	3	2
b)	Two shafts that are parallel are 10 meters apart. They are provided with pulley of 400 mm and 600 mm respectively. Compare the belt lengths for open and crossed belt drives.	8	3	3	2
16. a)	Draw the cam profile for the following specifications. Raise of 50 mm in 90° cam rotation with simple harmonic motion. Dwell for the next 30° revolution of the cam, followed by lowering with simple harmonic motion in 60° cam rotation. Continues in the same position for rest of the revolution. Analyze for maximum velocity and acceleration during raising and lowering. Given diameter of roller as 30 mm and minimum radius of cam 35 mm, diameter of the camshaft is 35 mm. Speed of camshaft is 200 rpm. Assume a knife edge follower and follower axis is passing through the center of the cam.	10	3	4	3
b)	Define nomenclature of cam with a neat sketch	4	2	4	2
17. a)	Compare involute and cycloidal tooth profiles	4	2	5	2
b)	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. Calculate the length of path of contact, arc of contact and the contact ratio.	10	4	5	2
18. a)	Calculate number of degrees of freedom of a quick return mechanism	2	2	1	2
b)	Let ABCD be a four bar chain. Crank AB rotates at 12 radians/sec clockwise. Link AD is fixed. Lengths of links are AB= 60mm, BC = CD = 70 mm, DA = 120 mm. When angle DAB is 60 degrees and both B and C lie on the same side of AD, build acceleration diagram for angular accelerations of BC and CD.	12	4	2	2
19.	Answer any <i>two</i> of the following:				
a)	Develop expression for length of chain drive	7	3	3	2
b)	Show displacement diagram for parabolic motion of cam follower. Assume your own data.	7	2	4	2
c)	In an epi-cyclic gear train, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the center of the gear A which is fixed, determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B?	7	4	5	2

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

S. No.	Criteria for questions	Percentage
1	Fundamental knowledge (Level-1 & 2)	57.8%
2	Knowledge on application and analysis (Level-3 & 4)	42.2%
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	--