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Code No. : 14547

VASAVI COLLEGE OF ENGINEERING (AUTONOMOUS), HYDERABAD

Accredited by NAAC with A++ Grade

B.E. (Mech. Engg.) IV-Semester Main & Backlog Examinations, July-2022

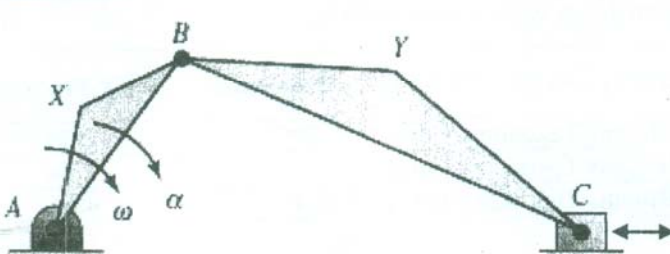
Kinematics of Machines

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.	Distinguish between open pair and closed pair.	2	2	1	1
2.	Define Grashof's Law?	2	1	1	1
3.	What is velocity of rubbing and give the formula for finding it.	2	3	2	2
4.	A link PQ of length 4 m is rotating with uniform angular velocity of 2 rad/s about the pivot point at P, A point R at a distance 3 m from P is radially sliding with constant linear velocity of 2 m/s. What is the absolute acceleration of point R?	2	2	2	3
5.	Sketch a double Hooke's joint and state its applications.	2	1	3	2
6.	What are the advantages of V-belts over Flat belts?	2	1	3	2
7.	Define pressure angle in a radial cam and state its effect on side thrust.	2	2	4	1
8.	Define Jerk and write the formulae for finding it in SHM follower.	2	2	4	2
9.	List the methods of avoiding Interference in involute gears.	2	3	5	1
10.	What are the advantages of epi-cyclic gear trains?	2	1	5	2
Part-B (5 × 8 = 40 Marks)					
11. a)	Define Degrees of freedom of (i) Link (ii) Kinematic pair (iii) Mechanism.	3	3	1	1
b)	Explain the working of Whit-worth quick return mechanism and develop the expression for ratio of times during forward stroke to return stroke.	5	2	1	2
12.	A slider crank mechanism is shown in Fig.1, having link dimensions: AB=120 mm, AX=70 mm, BX=60 mm, BC=400 mm, BY=250 mm and CY=220 mm. The crank AB is at 70°. The angular velocity (ω) and angular acceleration (α) of crank are 10.2 rad/s and 200 rad/s ² respectively. Determine:				
					
Fig.1					
a)	Absolute linear acceleration of point C.	5	3	2	3
b)	Angular acceleration of link BC.	3	3	2	3

13. a)	Illustrate the law of steering and develop the condition to satisfy the law of steering in Davis steering gear mechanism.	5	1	3	2
b)	Discuss the effect of centrifugal tension on power transmission through belt drive.	3	2	3	1
14.	Draw the profile of a radial cam operating a roller follower of radius 8 mm having a lift of 30mm. The cam raises the follower with SHM for 150° of the rotation followed by a period of dwell for 60° . The follower descends for the next 100° rotation of the cam with uniform acceleration and uniform retardation, again followed by a dwell period. The cam rotates at a uniform velocity of 120 rpm and has a least radius of 20mm. What will be the maximum velocity and acceleration of the follower during the lift and the return?	8	2	4	4
15. a)	Define Length of path of contact for a gear pair and develop the expression for it.	3	1	5	3
b)	The number of teeth on the gear and the pinion of two spur gears in mesh are 30 and 18 respectively. Both the gears have a module of 6mm and pressure angle of 20° . If the pinion rotates at 400 rpm, what will be the sliding velocity at the moment the tip of the tooth of pinion has contact with the gear flank? Take addendum equal to one module. Also, find the maximum velocity of sliding.	5	3	5	4
16. a)	Discuss the Elliptical Trammel mechanism and prove that the locus of a point on connecting link traces an ellipse.	4	3	1	2
b)	Explain how to find the linear velocity of the slider in a slider crank mechanism by using I-center method.	4	3	2	1
17.	Answer any <i>two</i> of the following:				
a)	Develop the expression for the Ratio of friction tensions in Flat belt drive.	4	4	3	1
b)	Discuss the Cycloidal follower motion.	4	3	4	2
c)	Discuss the Reverted Gear train with a neat sketch.	4	2	5	1

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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