Hall Ticket Number:

Code No. : 14515 N/O

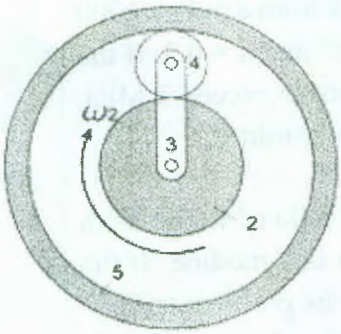
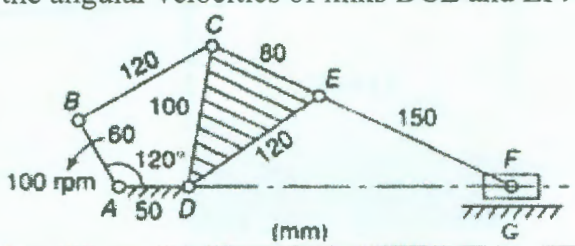
VASAVI COLLEGE OF ENGINEERING *(Autonomous)*, HYDERABAD

B.E. (Mech. Engg.: CBCS) IV-Semester Main & Backlog Examinations, May-2019

Kinematics of Machines

Time: **3** hours Max. Marks: **60**

*Note: Answer **ALL** questions in **Part-A** and any **FIVE** from **Part-B***

Q.No.	Stem of the question	M	L	CO	PO
	Part-A (10 × 2 = 20 Marks)				
1.	Determine the degrees of freedom of the mechanism shown in Fig. 	2	2	1	1
2.	Define Grashofs law.	2	1	1	1
3.	What is the velocity of rubbing and how it is determined?	2	1	2	1
4.	What is Coriolis component of acceleration and how is its direction and magnitude determined?	2	2	2	1
5.	Classify cams according to follower displacements.	2	2	3	1
6.	Explain pressure angle and state its effect on side thrust acting on the follower.	2	2	3	1
7.	Interpret the effect of centrifugal tension on maximum power transmission in belt drives?	2	2	4	1
8.	Express mathematically length of belt in cross belt drive.	2	2	4	1
9.	Define pressure angle in gears and list the preferred values of pressure angle.	2	1	5	1
10.	Explain interference in gears and mention methods to reduce it.	2	2	5	1
	Part-B (5 × 8 = 40 Marks)				
11. a)	Explain the types of constrained motions with neat sketches.	3	2	1	1
b)	Define Inversion of a Mechanism and Explain inversions of double slider-crank chain with suitable sketches.	5	2	1	1
12.	For the mechanism shown in Fig., solve the problem to find linear velocities of points E and F and the angular velocities of links DCE and EF. 	8	3	2	2

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13.	A cam drives a flat reciprocating follower in the following manner: During first 100° rotation of the cam, follower moves outwards through a distance of 35 mm with simple harmonic motion. The follower dwells during next 40° of cam rotation. During next 140° of cam rotation, the follower moves inwards with parabolic motion. The follower dwells for the next 80° of cam rotation. The minimum radius of the cam is 35 mm. Develop the profile of the cam. Also find the maximum velocity, maximum acceleration and maximum jerk during outward motion.	8	3	3	3
14. a)	Derive the expression for maximum power transmission in belt drives.	2	3	4	2
b)	A leather belt 110 mm wide and 8 mm thick, transmits power from a pulley 1000 mm diameter which runs at 600 rpm. The angle of lap is 150° and $\mu = 0.3$. If the mass of 1 m^3 of leather is 1 kg and the stress in the belt is not to exceed 3 MPa, solve the problem to find the maximum power that can be transmitted.	6	3	4	2
15. a)	Compare cycloidal and involute teeth.	2	2	5	2
b)	Two gear wheels mesh externally and are to give a velocity ratio of 4. The teeth are of involute form of module 5. The standard addendum is 1 module. If the pressure angle is 20° and pinion rotates at 120 rpm. Solve the problem to find: 1. the number of teeth on each wheel, so that the interference is just avoided, 2. the length of path of contact, and 3. the maximum velocity of sliding between the teeth.	6	3	5	2
16. a)	Explain the working principle of Davis steering gear mechanism with a neat sketch.	4	2	1	2
b)	Explain the procedure for finding the velocity of slider in a slider-crank mechanism by using Instantaneous center method	4	2	2	2
17.	Answer any ***two*** of the following:				
a)	Explain follower motion of SHM.	4	2	3	2
b)	Discuss the slip in belt drive and its effect on velocity ratio.	4	2	4	2
c)	Sketch a reverted gear train mechanism and determine its gear train value	4	2	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)	62.5%
2	Knowledge on application and analysis (Level-3 & 4)	37.5%
3	*Critical thinking and ability to design (Level-5 & 6) (*wherever applicable)	NIL

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