GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–III (NEW) EXAMINATION – WINTER 2020

Subject Code:3131906   **Date:05/03/2021**
Subject Name:Kinematics and Theory of Machine
Time:10:30 AM TO 12:30 PM   **Total Marks:56**

Instructions:
1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

|			Marks
Q.1	**(a)**	What are usual types of joints in a mechanism?	**03**
	(b)	Define: Kinematic link, Kinematic chain, Mechanism, Lower pair.	**04**
	(c)	Illustrate the inversion of a double slider crank mechanism giving example.	**07**
Q.2	**(a)**	Contrast Linear velocity & Velocity of rubbing.	**03**
	(b)	Interpret the Phenomenon of "slip"& "creep" in a belt drive.	**04**
	(c)	Derive the relation for ratio of belt tension in a flat belt drive.	**07**
Q.3	**(a)**	State and explain angular-velocity ratio theorem as applicable to mechanism.	**03**
	(b)	Explain briefly dimensional synthesis.	**04**
	(c)	An epicyclic train of gears is arranged as shown in Figure. How many revolutions does the arm, to which the pinions B and C are attached, make : 1. when A makes one revolution clockwise and D makes half a revolution anticlockwise, and 2. When A makes one revolution clockwise and D is stationary? The number of teeth on the gears A and D are 40 and 90 respectively.	**07**
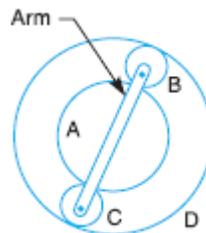
Q.4	**(a)**	Explain solid friction, rolling friction and greasy friction.	**03**
	(b)	What are different types of pulleys? Explain briefly with sketch.	**04**
	(c)	The speed ratio of the reverted gear train, as shown in Figure, is to be 12. The module pitch of gears A and B is 3.125 mm and of gears C and D is 2.5 mm. Calculate the suitable numbers of teeth for the gears. No gear is to have less than 24 teeth.	**07**
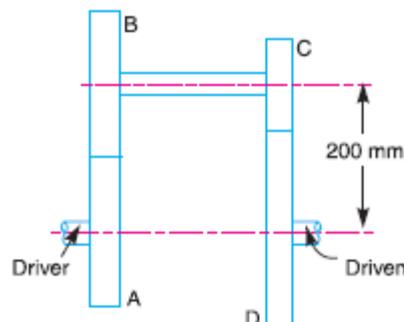
Q.5 **(a)** What is contact ratio? Explain its significance 03
(b) Formulate freudenstein's equation. 04
(c) Two pulleys, one 450 mm diameter and the other 200 mm diameter are on parallel shafts 1.95 m apart and are connected by a crossed belt. Find the length of the belt required and the angle of contact between the belt and each pulley. What power can be transmitted by the belt when the larger pulley rotates at 200 rev/min, if
the maximum permissible tension in the belt is 1 kN, and the coefficient of friction between the belt and pulley is 0.25 ? 07

Q.6 **(a)** Explain in brief Function, Path & Motion Generation. 03
(b) Differentiate between Involute and Cycloidal profile of gear tooth. 04
(c) State & prove the law of gearing. 07

Q.7 **(a)** Explain types of constrain motion. 03
(b) Explain internal expanding shoe brake. 04
(c) The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine : 1. Linear velocity and acceleration of the midpoint of the connecting rod, and 2. angular velocity and angular
Acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position. 07

Q.8 **(a)** Explain cone clutch with sketch. 03
(b) Classify followers & explain with neat sketch. 04
(c) A cam is to be designed for a knife edge follower with the following data : 07
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 cam shaft. The radius of the base circle of the cam is 40 mm.

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