Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV (Old) EXAMINATION – WINTER 2019

Subject Code: 141902 **Date: 14/12/2019**

Subject Name: Kinematics Of Machines

Time: 10:30 AM TO 01:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Sketch double slider cranks chain & draw its inversion	**07**
	(b)	Define: Kinematic link, Kinematic chain, Mechanism, Degrees of freedom, Lower pair, Higher pair, Inversion	**07**
Q.2	**(a)**	Explain modified Scott Russell mechanism with the help of neat sketch	**07**
	(b)	Enlist different types of steering gear mechanism of automobile. Explain any one in detail with neat sketch	**07**
		OR	
	(b)	Explain Klein's construction method in detail with neat sketch	**07**
Q.3	**(a)**	Classify synthesis problems	**07**
	(b)	Explain briefly dimensional synthesis	**07**
		OR	
Q.3	**(a)**	Two 20^0 involute spur gear mesh externally and give a velocity ratio of 3. The module is 3 mm and the addendum is equal to 1.1 modular. If the pinion rotates at 120 rpm, Determine: (1) Minimum number of teeth on each wheel to avoid interference (2) Contact ratio.	**07**
	(b)	State and prove the law of gearing.	**07**
Q.4	**(a)**	Discuss relative merits and demerits of belt, rope and chain drive for transmission of power.	**07**
	(b)	What are different types of chains? Explain with neat sketches of power transmission chains.	**07**
		OR	
Q.4	**(a)**	Explain the Phenomenon of "slip"& "creep" in a belt drive.	**07**
	(b)	A casting weighing 9 kN hangs freely from a rope which makes 2.5 turns round a drum of 300 mm diameter revolving at 20 rpm. The other end of the rope is pulled by a man. The coefficient of friction is 0.25. Determine: (1) The force required by a man (2) The power to raise the casting.	**07**
Q.5	**(a)**	Explain instantaneous centre method for finding out velocity of a point on link. 0	**07**
	(b)	In a four bar chain ABCD, AD is fixed link. Crank AB rotates in clock wise direction at an angular velocity of 10 rad/sec. Link AB=60 mm, BC=CD=70 mm, DA=120 mm. When angle DAB=600 and the points B and D are on one side of the link AD, Find angular velocity of link BC and link CD.	**07**
		OR	
Q.5	**(a)**	Classify followers & explain with neat sketch	**07**
	(b)	A cam is to be designed for a knife edge follower with the following data: 1. Cam lift=40 mm during 90^0 of cam rotation with SHM. 2. Dwell for the next 30^0. 3. During the next 60^0 of cam rotation, the follower returns to its original position with SHM. 4. Dwell during the remaining 180^0. Draw the cam profile when the line of stroke is passing from the axis of the cam shaft. The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 rpm.	**07**

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