Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 141902 **Date: 08/06/2017**

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)** Define : **07**

(1) Higher Pair
(2) Kinematic Link
(3) successfully Constrained Motion
(4) Degree of freedom

(b) Enlist different types of steering gear mechanism of automobile. Explain any one in detail with neat sketch. **07**

Q.2 **(a)** Explain modified Scott Russell mechanism with the help of neat sketch. **07**

(b) Sketch and explain the various inversions of a Double slider crank chain. **07**

OR

(b) Explain Klein's construction method in detail with neat sketch. **07**

Q.3 **(a)** What is gear train? Give classification of it and Explain epicyclic gear train in detail. **07**

(b) Differentiate between involute and cycloidal profile of gear teeth. **07**

OR

Q.3 **(a)** Explain the interference in involute gears. How interference should be prevented? **07**

(b) Derive the expression for the length of path of contact and length of arc of contact. **07**

Q.4 **(a)** Explain the following terms as applied to cam. **04**

1. Base circle 2. Pitch circle 3. Pressure angle 4. Stroke of follower.

(b) A cam rotating clockwise at a uniform speed of 1000 r.p.m. is required to give a roller follower the motion defined below. **10**

1. Follower to move outwards through 50 mm during 120° of cam rotation,
2. Follower to dwell for next 60° of cam rotation
3. Follower to return to its starting position during next 90° of cam rotation
4. Follower to dwell for the rest of the cam rotation.

The minimum radius of the cam is 50 mm and the diameter of roller is 10 mm. the line of stroke of the follower is off-set by 20 mm from the axis of the cam shaft. If the displacement of the follower takes place with uniform and equal accelerations and retardation on both the outward and return strokes, draw profile of the cam.

OR

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**
Q.5	**(a)**	Describe the construction and working of a centrifugal clutch	**07**
	(b)	A square threaded bolt of root diameter 22.5 mm and pitch 5 mm is tightened by screwing a nut whose mean diameter of bearing surface is 50 mm. if coefficient of friction for nut and bolt is 0.1 and for nut and bearing surface is 0.16 , find the force required at the end of a spanner 500 mm long when the load on the bolt is 10 KN.	**07**

OR

Q.5	**(a)**	What is centrifugal tension in a belt? How does it affect the power transmitted? Also explain the phenomena of slip and creep.	**07**
	(b)	Derive equation for finding out the limiting tension ratio in a belt drive.	**07**

****