Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–III (New) EXAMINATION – WINTER 2018

Subject Code: 2131906 Date: 12/12/2018

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.**

			MARKS
Q.1	**(a)**	Types of Constrained Motion.	**03**
	(b)	Define:- Mechanism, higher Pair, Fluid Link, Kinematics	**04**
	(c)	Explain Various Inversion of single Slider Kinematic Chain with Examples.	**07**
Q.2	**(a)**	Derive freudenstein's equation.	**03**
	(b)	Explain Velocity Analysis of a Slider Crank Mechanism.	**04**
	(c)	Explain in brief Function, Path & Motion Generation.	**07**
		OR	
	(c)	Explain synthesis of function generation.	**07**
Q.3	**(a)**	Types of Instantaneous Centers.	**03**
	(b)	What is Pantograph? Explain in Details of Pantograph.	**04**
	(c)	What is straight line motion mechanism with neat sketch?	**07**
		OR	
Q.3	**(a)**	Define: Circular pitch, Tooth thickness, Addendum.	**03**
	(b)	Explain Law of Gearing with neat sketch.	**04**
	(c)	Classification of Gears with Advantages & Disadvantages.	**07**
Q.4	**(a)**	Explain with a neat sketch of the Differential Gear Box.	**03**
	(b)	Explain Reverted gear Train with a neat sketch.	**04**
	(c)	Two gear wheels of 10 cm and 15 cm pitch diameter have involute teeth of 1.6 DP and pressure angle 20°. The addenda are 3 mm. Determine (i) Length of path of contact (ii) Contact ratio (iii) angle turned by pinion, while any pair of teeth in contact.	**07**
		OR	
Q.4	**(a)**	Types of Cams with Examples.	**03**
	(b)	Explain in brief simple harmonic motion of follower.	**04**
	(c)	A crank and rocker mechanism ABCD has the following dimensions. AB=0.75 m, BC=1.25 m, CD=1 m, AD=1.5 m. E is the mid point of the coupler link BC. AD is the fixed link. Crank AB has an angular velocity of 20 rad/s counter clockwise and deceleration of 280 rad/s2 at the instant angle DAB=60°. Find 1. Instantaneous linear velocity and acceleration of midpoint E of link BC. 2. Instantaneous angular velocity and acceleration of link CD.	**07**
Q.5	**(a)**	Explain Linear velocity & Velocity of rubbing.	**03**
	(b)	Explain working & construction of hook's joint.	**04**
	(c)	In a four bar chain ABCD, AO is fixed link. Crank AB rotates in clockwise direction at an angular velocity of 10 rad/sec. Link AB = 60 mm, BC = CD = 70 mm, DA = 120 mm. when angle DAB = 60° and the points B and D are on one side of the link AD, Find angular velocity of link CD and link BC.	**07**

OR

Q.5	**(a)**	Define: - Dwell angle, Pressure angle and Pitch curve.	**03**
	(b)	Classification of followers.	**04**
	(c)	A flat face follower is moved with S.H.M by a disc cam. Follower rises for 30 mm during the cam rotation of 120°, remains in the same position during 30° of cam rotation, follower returns to original position during further 120° of rotation of cam and then for last 90° of rotation follower remains stationary. Minimum radius of cam is 25 mm and the diameter of the circular flat face of follower is 25 mm. Draw the cam profile.	**07**

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