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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-III (NEW) EXAMINATION - SUMMER 2019			
Sub	ject	Code: 2131906	Date: 18/06/2019
Sub	ject	Name:Kinematics of Machines	
Time: 02:30 PM TO 05:00 PMTotal Marks: 70			Total Marks: 70
Instr	ruction	15:	
	1.	Attempt all questions.	14E7
	2. 3.	Figures to the right indicate full marks.	ıy.
			MARKS
0.1	(a)	Explain the terms:	03
		1. Machine 2. Structure 3. Mechanism	
	(b)	Sketch and explain inversions of four bar chain mechanism(any two)	
	(c) What are the types of inversions? Explain crank and slotted lever type return mechanism.		nk and slotted lever type quick 07
02	(a)	a) Classify straight line generating mechanisms.	
~· -	(b)) State and prove 'Aronhold Kennedy's Theorem' of three instantaneous	
		centres.	
	(c) Explain the Freudenstein's method of three-point synthesis of mechanisms OR		bint synthesis of mechanisms. 07
(c) Explain chebyshev spacing method for location precision poi four bar chain mechanism.		Explain chebyshev spacing method for locat four bar chain mechanism.	ion precision point position in 07
0.3 (a) Define linear and angular velocity		Define linear and angular velocity.	03
X ¹⁰	(b) Write a short note on velocity and acceleration diagram.		n diagram. 04
	(c)	PQRS is a four bar chain mechanism. The length of the links are PQ =	
		62.5mm; QR = 175mm; RS = 112.5mm; and PS = 200 mm. the link PS is	
		a fixed link. The crank PQ rotates at 10 rad/s clockwise and makes 60^{0}	
		with i.d.c. Draw the velocity and acceleration diagram. Q and R lie on the	
		same side of PS. Find the angular velocity and angular acceleration of links	
		QR and RS.	
03	(a)	Explain function generation	03
Q.J	(b) Define Type synthesis and Number synthesis.		us. 04
	(č)	(c) Synthesize a four bar mechanism to meet the following instantaneous conditions for input output links:	
		$\theta = 60^{\circ} \qquad \Phi = 90^{\circ}$	
		$\omega_2 = 3 \text{ rad/sec}$ $\omega_4 = 2 \text{ rad}$	l/sec
		$\alpha_2 = -1 \operatorname{rad/sec}^2 \qquad \alpha_4 = 0$	
Q.4	(a)	What is speed ratio and velocity ration in ge	ar trains. 03
	(b)	Write a complete classification of gear trains.04	
	(c)	Explain the working of Epicyclic gear train with sketch. Also give its 07 applications. what are the advantages of Epicyclic gear train?	



(a)

(b)

Q.4

What are the standard tooth profiles?

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- 04
- 07

03

03

Two involute gears of pressure angle are rotating in mesh. The speed of (c) smallest gear is 1400 rpm. The number of teeth on pinion is 20 and gear ratio is 2. If the addendum of pinion and wheel is standard and equal to one module and module is 5mm.Consider pressure angle as 20. Find:

(i) length of arc of contact.

(ii) velocity of sliding at the point of contact.

What is interference and undercutting in gear?

- Q.5 (a) What is cam and follower?
 - (b) Roller follower is more preferable to that of knife edged follower .why? 04
 - Define the following terms as applied to cam with neat figure. (i) Base 07 (c) circle (ii) Pitch circle, (iii) Pressure angle, (iv) stroke of the follower. (v) Prime circle.

OR

- (a) What are the types of motion of the follower? Q.5
 - With the help of neat sketches explain the types of cams and followers **(b)** 04 07
 - (c) Draw a cam profile for a given data:
 - 1. Outstroke during 60° of cam rotation
 - 2. Dwell for the next 45 ^o of cam rotation
 - 3. Return stroke during next 60° of cam rotation and
 - 4. Dwell for the remaining of cam rotation

The stroke of follower is 50mm and the minimum radius of the cam is 40mm. The follower moves with uniform velocity during both the outstroke and return strokes. The follower is of knife edge type. Draw the profile of the cam when the axis of the follower is passes through the axis of cam shaft.