Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–II • EXAMINATION – SUMMER 2013

Subject Code: X21902 **Date: 10-06-2013**

Subject Name: Kinematics of Machines

Time: 02.30 pm - 05.00 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)** Discuss briefly the various types of belts used for the transmission of power. **07**

(b) A flat belt runs on a pulley 1 meter in diameter and transmit 8 kW at 200 rpm. Assuming angle of lap as 170° and co efficient of friction as 0.2. Neglecting centrifugal tension. Find: (1) limiting tension ratio (2) tension on the tight and slack side respectively and (3) necessary width of belt when the pull is not to exceed 20 N per mm width of the belt. **07**

Q.2 **(a)** Differentiate between the following : (1) sliding pair and rolling pair (2) link and linkage and (3) higher pair and lower pair. **07**

(b) What is meant by an inversion of a mechanism ? Enlist an inversion of single slider crank chain and explain any one with neat sketch. **07**

OR

(b) State and explain Kennedy theorem. **07**

Q.3 **(a)** Explain the working of epicyclic gear train with sketch. Also give its applications. **07**

(b) Explain " Interference" as related to toothed gears. Discuss the various methods used to avoid interference. **07**

OR

Q.3 **(a)** With the help of neat sketches explain the types of cams and followers. **07**

(b) Draw the profile of a cam operating a knife edge follower from the following data : **07**

(1) Follower lifts through 40 mm during 60° rotation

(2) Follower remains at rest for next 30° rotation of the cam.

(3) Follower then descends to its original position during 90° rotation of the cam.

(4) Follower remains at rest for the rest of the revolution. The least radius of the cam is 50 mm.

The motion during ascent and descent is simple harmonic motion and the line of stroke of the follower passes through the axis of the cam shaft.

Q.4 **(a)** Define Instantaneous centre. Give a relationship between the number of instantaneous centre and number of links in a mechanism. **07**

(b) Explain coriolis component of acceleration and derive an expressions **07**

for coriolis component of acceleration.

OR

Q.4	**(a)**	What are the different types of chains ? Explain with neat sketches, the power transmission chains.	**07**
	(b)	Explain the types of ropes drives and discuss the advantages and limitation of rope drives over other drive.	**07**
Q.5	**(a)**	Explain the working of a multi plate clutch with the help of neat sketch.	**07**
	(b)	Draw with neat sketch : (1) flat pivot bearing and (2) flat collar pivot bearing. A flat foot step bearing 225 mm in diameter supports a load of 8 kN. If the co efficient of friction is 0.09 and shaft rotates at 60 rpm, calculate the power lost in friction.	**07**

OR

Q.5	**(a)**	Pitch of a 50 mm diameter threaded screw of a screw jack is 12.5 mm. The co efficient of friction between the screw and nut is 0.13. Determine the torque required on the screw to raised a load of 27 kN assuming load to be roatating with screw. Determine the ratio of the torque required to raise and lower the load and the also the efficiency of the machine.	**07**
	(b)	Explain the following : (1) dry friction (2) boundary friction (3) film friction and (4) limiting angle of friction.	**07**

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