Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(OLD) • EXAMINATION – WINTER 2016

Subject Code:142001 **Date:22/11/2016**

Subject Name: Kinematics And Dynamics Of Machines

Time:02:30 PM to 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)** Enlist the inversions of single slider crank chain and explain any one in details. **07**

(b) Explain Pantograph with neat sketch. **07**

Q.2 **(a)** Classify the types of cam followers with neat sketch. **07**

(b) A Radial cam is designed for a knife edge follower with the following data: **07**

1. Cam lift = 40 mm during 90^0 of cam rotation with uniform velocity.
2. Dwell for the next 45^0.
3. During the next 60^0 of cam rotation, the follower returns to its original position with simple harmonic motion.
4. Dwell during the remaining 165^0.
5. The radius of base circle of the cam is 40 mm.

Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft.

OR

(b) A offset cam is designed for a roller follower with the following data: **07**

1. Cam lift = 50 mm during 120^0 of cam rotation with simple harmonic motion.
2. Dwell for the next 30^0.
3. During the next 60^0 of cam rotation, the follower returns to its original position with simple harmonic motion.
4. Dwell during the remaining 150^0.
5. The radius of base circle of the cam is 30 mm and the diameter of roller is 20 mm.

Draw the profile of the cam when the line of stroke is offset 15 mm from the axis of the cam shaft.

Q.3 **(a)** State and prove the Law of gearing with neat sketch. **07**

(b) Explain the effect of gyroscopic couple on a naval ship during steering. **07**

OR

Q.3 **(a)** Explain the effect of gyroscopic and centrifugal couple while a two wheel vehicle is taking a turn with neat sketch. **07**

(b) Classify various gear trains and explain Reverted gear train with neat sketch. **07**

Q.4 **(a)** Explain the effect of centrifugal tension in flexible power transmission system. **07**

(b) Power is transmitted using a V-belt drive. The included angle of V-groove is 30^0. The belt is 20 mm deep and maximum width is 20 mm. If the mass of the belt is 0.35 kg per meter length and maximum allowable stress is 1.4 MPa. **Determine** the maximum power transmitted when the angle of lap is 140^0. **Take** μ=0.15 **07**

OR

Q.4 **(a)** Differentiate Involute and cycloidal tooth profile. **07**

(b) Four masses A, B, C and D are attached to a shaft and revolve in the same plane. The masses are 12 kg, 10 kg, 18 kg and 15 kg respectively and their radii of rotations are 40 mm, 50 mm, 60mm and 30 mm. The angular position of the balancing masses B, C and D are 60^0 , 135^0 and 270^0 from the mass A. **Find** the magnitude and position of the balancing mass at a radius of 100 mm. **07**

Q.5	**(a)**	Classify various vibrations in mechanical systems and explain vibration isolation in details.	**07**
	(b)	Explain types of constrained motions with neat sketch.	**07**

OR

Q.5	**(a)**	Explain coriolis component of acceleration in details.	**07**
	(b)	PQRS is a four bar chain with link PS fixed. The lengths of the links are PQ = 62.5 mm; QR = 175 mm; RS = 112.5 mm; and PS = 200 mm. The crank PQ rotates at 10 rad/s clockwise. **Draw** the velocity and acceleration diagram when angle QPS = 60^0 and Q and R lie on the same side of PS. Find the angular velocity and angular acceleration of links QR and RS.	**07**

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