Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2018

Subject Code: 2142001 **Date: 05/12/2018**

Subject Name: Kinematics & 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)**	What is the difference between machine, mechanism, and structure?	**03**
	(b)	Explain the term (i) Lower pair (ii) Higher pair (iii) Kinematics (iv) Inversion	**04**
	(c)	Explain different Kinematic Pairs with suitable examples.	**07**
Q.2	**(a)**	Define instantaneous center and instantaneous axis.	**03**
	(b)	State and explain types of constrained motion with figure.	**04**
	(c)	A four bar mechanism with AB = 20 cm, BC = 30 cm, CD = 32 cm and AD = 60 cm dimension. Crank AB rotates at uniform speed of 300 r.p.m. in anticlockwise direction. When the crank AB has turned 60o, locate all the instantaneous centers and find the angular velocity of link BC.	**07**
		OR	
	(c)	Draw & Explain Klein's Construction using velocity diagram.	**07**
Q.3	**(a)**	What is the advantage of a compound gear train over a simple gear train?	**03**
	(b)	State Law of Gearing & Contact Ratio.	**04**
	(c)	Explain with a neat sketch the "Sun and Planet Wheel". Write its Merits and Demerits as compared to Reverted and Compound Gear Trains.	**07**
		OR	
Q.3	**(a)**	Explain the phenomena of 'Slip' and 'Creep' in a belt drive.	**03**
	(b)	Explain basic terms used for gyroscopic couple with proper diagram.	**04**
	(c)	For a flat belt, prove that $T1/T2 = e^{\mu\theta}$ Where T1 and T2= Tension in the tight and slack sides of the belt, θ = Angle of contact between the belt and the pulley, and μ = Coefficient of friction between the belt and the pulley.	**07**
Q.4	**(a)**	What do you mean by Balancing? Why it is Necessary for High Speed Engines?	**03**
	(b)	Discuss the effect of Gyroscopic Couple on Naval Ship.	**04**

(c) The Four Masses P, Q, R, S are carried by a rotating shaft at radii of 100 mm, 125 mm, 200 mm and 150mm respectively. The planes in which the masses revolve are spaced 600mm apart and the masses Q, R and S are 10kg, 5 kg and 4 kg respectively. Determine the required mass P and the relative angular position of four masses so that the shaft shall be in complete balance. **07**

OR

Q.4 **(a)** What are the different types of motion with which a follower can move? **03**

(b) Define term (i) Base circle (ii) Pitch circle (iii) pressure angel (iv) stroke of follower **04**

(c) Draw the profile of a cam when the line of stroke of the follower passes through the axis of the cam shaft. Knife-edged follower is raised with simple harmonic motion and is lowered with uniform velocity: Least radius of cam = 40 mm, Lift of follower = 40 mm, Angle of ascent = 90^o, Angle of dwell between ascent and descent = 30^o, Angle of descent = 60^o. **07**

Q.5 **(a)** What is a damped vibration? What are the different types of damping methods? **03**

(b) Distinguish between longitudinal, transverse and torsional vibration. **04**

(c) A spring mass damper system has a mass of 4 kg, a stiffness of spring is 300 N/m and damping coefficient of 35 N sec/m. Determine: (1) Natural Frequency of Damped Vibration, (2) Natural Frequency of the system, if instead of viscous damping dry friction damping is present. **07**

OR

Q.5 **(a)** What is meant by Vibration Isolation and Transmissibility? **03**

(b) Define following terms: (1) Amplitude, (2) Simple Harmonic Motion, (3) Time Period, (4) Frequency **04**

(c) A circular cylinder of mass 4 kg and radius 15 cm. is connected by a spring of stiffness 4000N/m as show in **Fig.1**. It is free to roll on horizontal rough surface without slipping determines the natural frequency. **07**

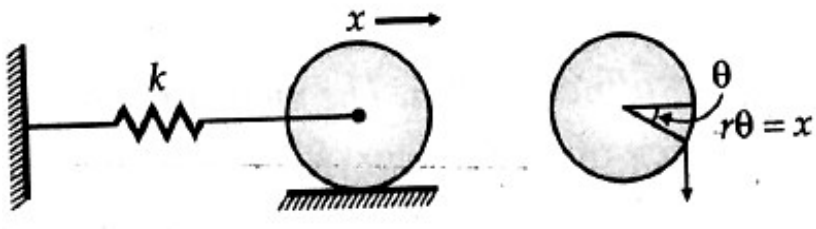

Fig.1

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