Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2142001 **Date:17/05/2019**

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)**	State and explain types of constrained motion with figure.	**03**
	(b)	Derive an equation for gayo-couple with usual notation	**04**
	(c)	What is Coriolis acceleration component? In which cases does it occur? How is it determined?	**07**
Q.2	**(a)**	Define instantaneous center and instantaneous axis.	**03**
	(b)	Enlist the types of inversion for (i) four bar kinematic chain (ii) single slider kinematic chain and (iii) double slides kinematic chain.	**04**
	(c)	Fig.1 Shows the toggle mechanism in which the crank OA rotates at a uniform speed of 105 rpm in clock wise direction. Determine the velocity and acceleration of slider P. The lengths of various links are: OA=8 cm, AB=18 cm, BC=24cm and BP=28 cm.	**07**
		OR	
	(c)	Describe Klein's construction with an example	**07**
Q.3	**(a)**	Derive an equation for length of path of contact for gear train	**03**
	(b)	Explain the effects of Gyroscopic couple on an Aero plane with sketch.	**04**
	(c)	Explain with a neat sketch the "Sun and Planet wheel". Write its merits nd demerits as compared to reverted and compound gear trains.	**07**
		OR	
Q.3	**(a)**	What are the different types of motion with which a follower can move?	**03**
	(b)	Derive the condition for correct steering. Sketch and show the Davis steering mechanism and discuss their advantages.	**04**
	(c)	A Flat faced mushroom follower is operated by a cam of minimum radius 50 mm and gives a lift of 30 mm. The rise takes place in 120˚ of cam rotation with SHM followed by a dwell for the next 30˚ of cam rotation. It returns with equal uniform acceleration and retardation during 90˚ of cam rotation. The line of action of the follower passes through the axis of the cam. Draw a cam profile and determine the maximum velocity and acceleration of the follower during the outward and return strokes, if the cam rotates at 240 rpm. What should be the minimum width of the follower?	**07**
Q.4	**(a)**	Explain the phenomena of 'slip' and 'creep' in a belt drive.	**03**
	(b)	Derive the condition for transmitting the maximum power in a flat belt drive.	**04**
	(c)	Explain the method of balancing of different masses revolving in same plane	**07**
		OR	
Q.4	**(a)**	What do you mean by balancing? Why it is necessary for high speed engines?	**03**
	(b)	Explain primary unbalanced force in reciprocating engine. Why reciprocating masses are partially balanced?	**04**
	(c)	What is the smallest number of teeth theoretically required in order to avoid interference on a pinion having pressure angle 22° and module 1 Which is to gear with 1) Rack	**07**

2) An Equal pinion
3) A wheel to give a ratio of 3:1.

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 flat belt runs on a pulley 1 m in diameter and transmits 8kW at 200 rpm. Assuming angle of lap as 170° and coefficient of friction as 0.25. Find the necessary width of belt if the pull is not exceed 200 N/cm width of the belt. Neglect centrifugal tension. **07**

OR

Q.5 **(a)** What is meant by vibration isolation and transmissibility? **03**

(b) Explain following term. **04**

(1) Time period (2) Frequency (3) Amplitude and (4) Damping.

(c) What do you understand by degree of freedom? What are the various causes of vibrations? How the effects of undesirable vibrations can be reduced? **07**

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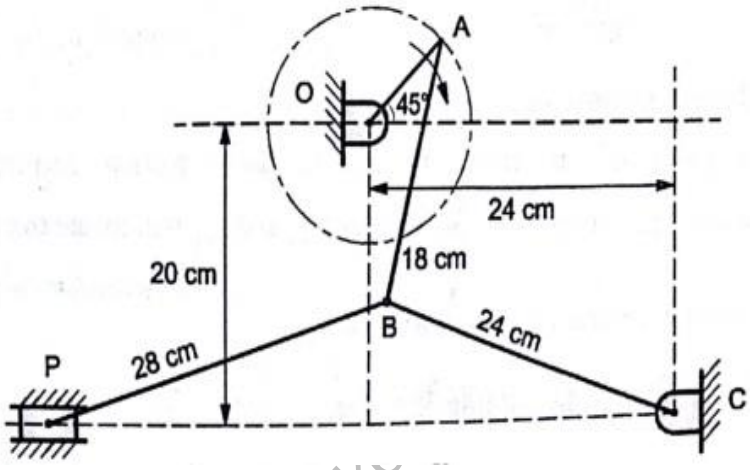

Q.2 (c) Fig. 1