Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV(New) EXAMINATION – SUMMER 2016

Subject Code:2142001   **Date:03/06/2016**
Subject Name:Kinematics & Dynamics of Machines
Time:10:30 AM to 01:00 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	**Short Questions. MCQ.**	**14**
1	In kinematic chain ,the minimum number of kinematic pairs require are: (a) 2 (b) 3 (c) 4 (d) 5	
2	Klein's construction can be used when the crank has : (a) Uniform angular velocity (b) Uniform angular acceleration (c) Non-Uniform angular velocity (d) a and b above	
3	If the initial tension in belt is increased, the power transmitted by the belt, (a) Reduces (b) Increases (c) Remains the same (d) Non of the above	
4	The velocity ratio of the gear should be: (a) 1 (b) More than 1 (c) Less than 1 (d) Any of the above	
5	The minimum radius circle drawn to the cam profile is known as: (a) Prime circle (b) Pitch circle (c) Basic circle (d) Pitch curve	
6	Which are the things required for existence of gyroscope effects: (a) Rotating Body (b) Force (c) a and b (d) None of the above	
7	For a Static balancing force acting on the shaft is zero : (a) the net dynamic force acting on the shaft is zero (b) the net couple acting on the shaft due to dynamic forces is zero (c) a and b both (d) none of the above.	
8	A nut and bolt forms of : (a) Turning Pair (b) Rolling Pair (c) Screw pair (d) Sliding Pair (e) Spherical Pair	
9	For the same belt and pulley materials and sizes, the ratio of tensions is case of V-belt compared of flat belt drive is, (a) High (b) Low (c) Same (d) None of the above	
10	An Epicyclic gear train is used to, (a) Reduce Space (b) Obtain high velocity (c) Transmit more power (d) Transmit less power (e) None of the above	
11	The Rang of pressure angle for spur gear is, (a) 5° to 14 ° (b) 14° to 20° (c) 20° to 30° (d) 30° to 40	
12	In Clock Mechanism, type of gear train used is. (a) Reverted Gear Train (b) Compound Gear Train (c) Simple Gear Train (d) Epicyclic Gear Train	
13	Which Type of cam follower is used in an aircraft (a) Roller (b) Flat faced (c) Knife Edge (d) Spherical faced	
14	The Speed at which resonance occurs is called	
Q.2 **(a)**	What is Inversion? Enlist various inversions of Four bar chain mechanism.	**03**
(b)	Explain the effects of Gyroscopic couple on an Aero plane with sketch.	**04**
(c)	Explain Klein's Construction using velocity and acceleration diagram	**07**

OR

(c) Fig. (1) Shows the toggle mechanism in which the crank OA rotates at a uniform **07** 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.

Q.3
(a) What is gear? Classification of Gear. **03**
(b) Derive an equation for length of path of contact for gear train **04**
(c) Following data is given for a rope pulley transmitting 23 kw. **07**
Diameter of pulley =400 mm   Speed = 110 rpm
Angle of groove =45°   Angle of Lap = 160°
Coefficient of Friction =0.28   Number of ropes =10
Mass of Kg/m length of ropes = 0.0053 G2 and working tension is limited 12.2 G2 N, Where G= girth (circumference) of rope in cm. Find. (1) Initial tension and (2) Diameter of each rope.

OR

Q.3
(a) What is Stabilization of ship? Why is it necessary? How it is achieved? **03**
(b) Difference between flat belt drive and V-belt drive. **04**
(c) An epicyclic gear train shown in Fig. (2) Has wheel S with 15 teeth fixed to a **07** motor shaft running at 1450 r.p.m. The planet has 45 teeth and it gears with fixed annular wheel A and rotates on a spindle carried by an arm which is fixed to the output shaft. P also gears with wheel S. Find the speed of the output shaft of the motor is transmitting 1.5 kW power. What is the torque exerted on the annular A.

Q.4
(a) What is Pantograph? What is the application of Pantograph? **03**
(b) Explain Types of Belt drives. **04**
(c) Two 20° involutes spur gears have module of 8 mm. Gear ratio 2.5, speed of gear **07** wheel 120 rpm number of teeth on gear wheel 80. The addendum is such that the path of approach and path of recess on each side are 40% of maximum possible length each. Determine the addendum for pinion and the wheel. Also determine the length of arc of contact. Does the interference occur?

OR

Q.4
(a) Why roller followers are preferred over knife edge follower? **03**
(b) Classification of followers with neat sketch. **04**
(c) Draw cam profile of a cam to raise a valve with S.H.M. through 40 mm in $1/4^{th}$ **07** of revolution keep it fully raised through $1/10^{th}$ revolution and to lower it with uniform acceleration and retardation in $1/6^{th}$ revolution. The valve remains closed during the rest of the revolution. The diameter of roller is 20 mm and minimum radius of cam to be 30 mm. The axis of the valve rod passes through the axis of cam shaft. The cam shaft rotates at 360 rpm clockwise.

Q.5
(a) Explain Static and Dynamics Balancing **03**
(b) Derive and Equation for Magnification factor. **04**
(c) The four masses m2, m3 and m4 having their radii of rotation as 200 mm, 150 **07** mm, 250 mm and 300 mm are 200 kg, 300 kg, 240 kg and 260 kg in magnitude respectively. The angles between the successive masses are 45°, 75° and 135° respectively. Find the position and magnitude of the balance mass required, if it, radius of rotation is 200 mm.

OR

Q.5
(a) Define the Terms: (1) Periodic Motion (2) Damping (3) Amplitude of Vibration **03**
(b) Explain with the help of transmissibility Vs. frequency ration curves at various **04** damping ratio.
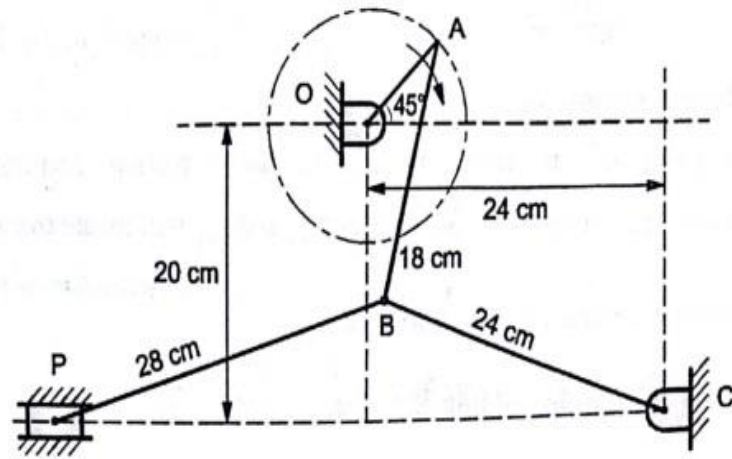**(c)** Define the terms vibration isolation and transmissibility. **07**
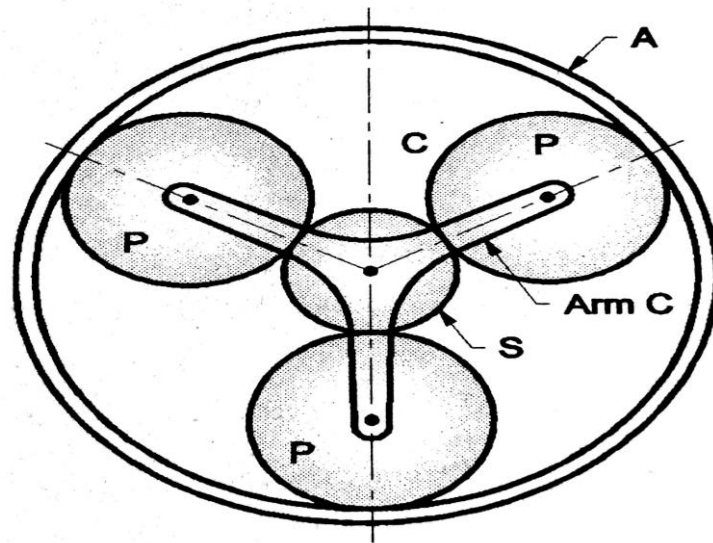
(P.T.O)

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2

Fig. (1) Q.2 (c) OR

Fig. (2) Q.3 (c) OR