

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE - SEMESTER-IV (OLD) EXAMINATION – WINTER 2018**

**Subject Code:141902**

**Date: 10/12/2018**

**Subject Name: Kinematics 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)** Discuss with neat sketch different types of steering gear mechanism of automobile in detail. **07**
- (b)** Define Number of degree of freedom and determine the number of degree of freedom for the mechanisms shown in Fig.1, 2, 3 **07**

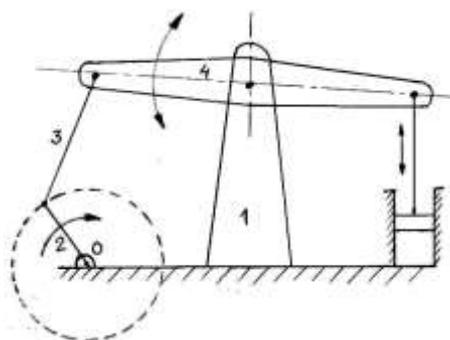


Figure:1

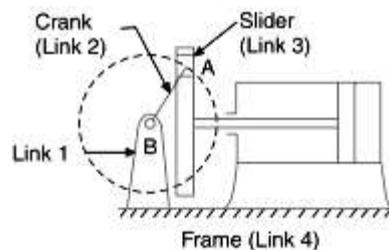


Figure:2

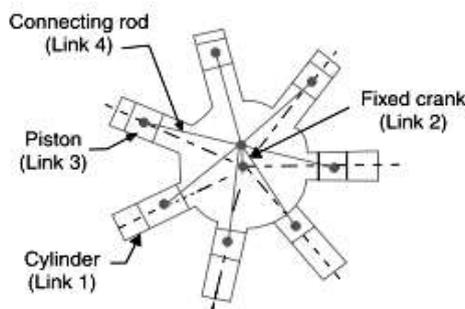


Figure:3

- Q.2 (a)** Explain “The common normal at the point of contact between a pair of teeth must always pass through the pitch point” **07**
- (b)** Define : **07**
1. Space Centrode
  2. Body Centrode
  3. Fixed instantaneous Centre
  4. Permanent instantaneous Centre

**OR**

- (b)** What is meant by inversion of mechanism? Sketch double slider cranks chain & draw its inversion. **07**
- Q.3 (a)** Define the following terms.(1)Link(2)Higher pair(3)Ternary Joint(4)Locked chain(5)constrained Motion(6)Degree of freedom(7)Quaternary link. **07**
- (b)** Write Short Note on Straight-Line Mechanism. **07**

**OR**

- Q.3 (a)** Derive an expression for the ratio of shafts velocities for Hooke's joint and draw the polar diagram depicting the salient features of driven shaft speed. **07**
- (b)** A double universal joint is used to connect two shafts in the same plane. The intermediate shaft is inclined at an angle of  $20^\circ$  to the driving shaft as well as the driven shaft. Find the maximum and minimum speed of the intermediate shaft and the driven shaft if the driving shaft has a constant speed of 500 r.p.m. **07**
- Q.4 (a)** The dimensions and configuration of the four bar mechanism, are as follows : **07**  
 $P_1A = 300$  mm;  $P_2B = 360$  mm;  $AB = 36$ mm, and  $P_1P_2 = 600$  mm The angle  $A$   
 $P_1P_2 = 60^\circ$ . The crank  $P_1A$  has an angular velocity of 10 rad/s and an angular acceleration of  $30 \text{ rad/s}^2$ , both clockwise. Determine the angular velocities and angular accelerations of  $P_2B$ , and  $AB$  and the velocity and acceleration of the joint B.
- (b)** Define Centrifugal tension for flat belt also discuss the effect of centrifugal tension on power transmission. **07**

**OR**

- Q.4 (a)** Explain cariole's component of acceleration. **07**
- (b)** Explain the Phenomenon of "slip" & "creep" in a belt drive. **07**
- Q.5 (a)** State & prove the law of gearing. **07**
- (b)** Explain Epicycle gear train with neat sketch. **07**

**OR**

- Q.5 (a)** What are different types of chains? Explain with neat sketches, the power transmission chains. **07**
- (b)** What are the various types of the torques in an epicyclic gear train ? **07**

