Seat No.: _____ Enrolment No.

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**

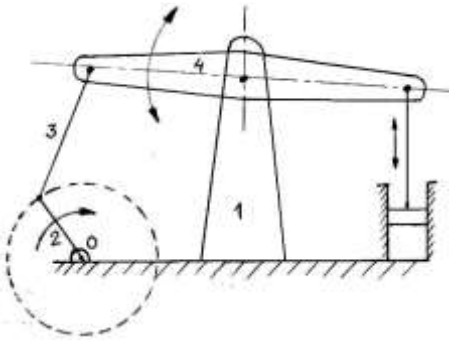

Figure:1

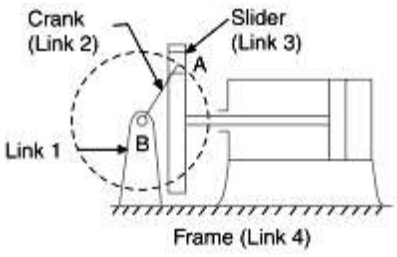

Figure:2

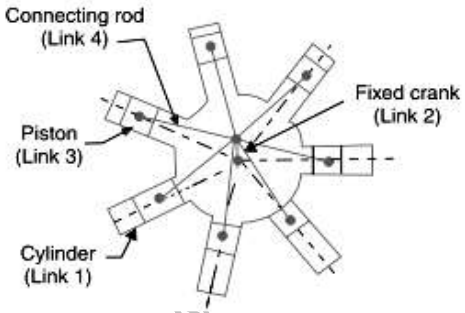

Figure:3

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° 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 : P_1A = 300 mm; P_2B = 360 mm; AB = 36mm, and P_1P_2 = 600 mm The angle A P_1P_2 = 60°. The crank P_1A has an angular velocity of 10 rad/s and an angular acceleration of 30 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. **07**

(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**