

II B. Tech II Semester Supplementary Examinations, November - 2019
KINEMATICS OF MACHINERY
 (Com to ME, AME, MIN)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **FOUR** Questions from **Part-B**

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**PART -A**

1. a) Define the term degrees of freedom of a mechanism. (2M)
- b) What are the disadvantages of a Davis steering gear mechanism? (2M)
- c) Explain the Application of relative velocity method four bar chain (2M)
- d) Why a roller follower is preferred to that of a knife-edged follower? (3M)
- e) Define the terms prime circle, pitch circle, base circle of a cam (3M)
- f) Differentiate between a belt drive and a chain drive. (2M)

**PART -B**

2. a) Prove that the peaucellier mechanism generates a straight-line motion. (7M)
- b) The track arm of a Davis steering gear is at a distance of 185 mm from the front main axle whereas the difference between their lengths is 90 mm. If the distance between steering pivots of the main axle is 1.2 m, determine the length of the chassis between the front and the rear wheels. Also find the inclination of the track arms to the longitudinal axis of the vehicle. (7M)
3. a) Give the classification of links of a machine. Explain each of them. (7M)
- b) Describe different inversions of double slider crank chain (7M)
4. a) Derive the expression to determine the magnitude of the coriolis component of acceleration (7M)
- b) Explain the procedure to determine the velocity and acceleration of a four-bar mechanism by Klein's construction. (7M)
5. Draw the profile of a cam operating a roller reciprocating follower and with the following data: (14M)  
 Minimum radius of cam =25 mm; lift=30mm; Roller diameter= 15mm. The cam lifts the follower for 120° with SHM, followed by a dwell period of 30°. Then the follower lowers down during 150° of cam rotation with uniform acceleration and retardation followed by a dwell period. If the cam rotates at a uniform speed of 150 RPM. Calculate the maximum velocity and acceleration of follower during the descent period.

6. The following data relate to a pair of  $20^\circ$  involute gears in mesh: (14M)  
Module = 6 mm, Number of teeth on pinion = 17, Number of teeth on gear = 49; Addenda on pinion and gear wheel = 1 module.  
Find: **a)** The number of pairs of teeth in contact; **b)** The angle turned through by the pinion and the gear wheel when one pair of teeth is in contact, and **c)** The ratio of sliding to rolling motion when the tip of a tooth on the larger wheel **(i)** is just making contact, **(ii)** is just leaving contact with its mating tooth, and **(iii)** is at the pitch point.
7. A compound gear is shown in Fig. 2. An input torque of 100 N-m is given to the shaft B at 900 r.p.m. The sun and planet gears are all of the same diameter and pitch. Determine the speed and torque of the output shaft C, if the efficiency is 96%. Also determine the torque required to hold stationary the annulus wheel A1 (14M)

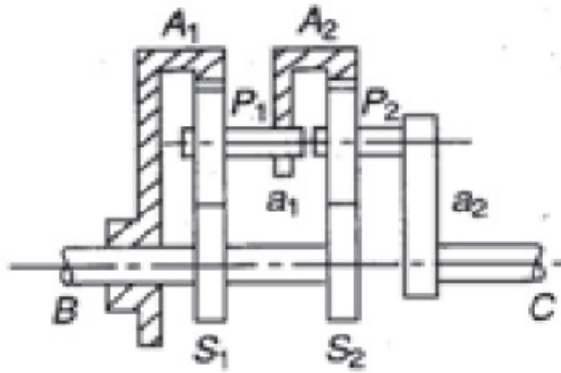


Fig.2

