FACULTY OF ENGINEERING

B.E. (M/P/AE) IV - Semester (CBCS) (Main & Backlog) Examination, May / June 2019

Subject : Kinematics of Machines

Time : 3 Hours   Max. Marks: 70

Note: Answer all questions from Part-A & any five questions from Part-B.

PART – A (20 Marks)

1. Differentiate mechanism and machine and structure with suitable examples.
2. Define the term inversions. Name any three inversions of four bar mechanism.
3. State the occurrence of coriolis component of acceleration with examples.
4. State Kennedy's theorem.
5. Differentiate self locking and over hauling screws.
6. State the function of clutch. Write the relevant equations.
7. State the various types of followers motions.
8. State the importance of gears. Give classification of gears.
9. Differentiate simple, compound and gear trains with relevant equations for velocity ratio.
10. Write the properties of involute gears.

PART – B (50 Marks)

11. Explain with neat sketches any four inversions of slider crank chain. State the importance of quick return mechanism with its applications.

12. The dimensions of the various links of a mechanism as shown in figure 1, are as follows: OA = 80 mm , AC = CB = CD = 120 mm. If the crank OA rotates at 150 r.p.m. in the anticlockwise direction, find, for the given configuration 1 velocity and acceleration of B and D : 2 rubbing velocity on the pin at C if its diameter is 20 mm and 3, angular acceleration of the link AB and CD
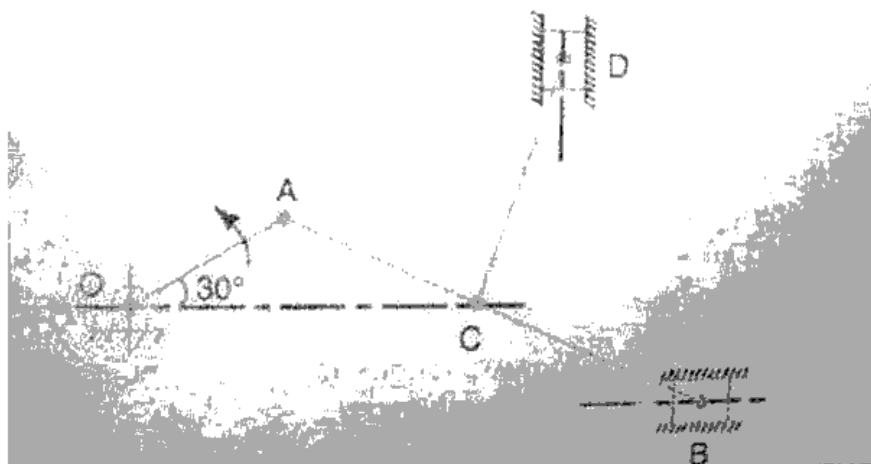

Fig: 1

13. Find the width of the belt, necessary to transmit 7.5 kW to a pulley 300 mm diameter, if the pulley makes 1600 r.p.m. and the coefficient of friction between the belt and the pulley is 0.22. Assume the angle of contact as 210° and the maximum tension in the belt is not to exceed 8 N/mm width.

14 From the following data, draw the profile of a cam in which the follower moves with simple harmonic motion during ascent while it moves with uniformly accelerated motion during descent. Least radius of cam = 50 mm; Angle of ascent = 48° ; Angle of dwell between ascent and descent = 42° ; Angle of descent = 60° ; Lift of follower = 40 mm ; Diameter of roller = 30 mm ; Distance between the line of action of follower and the axis of cam = 20 mm. If the cam rotates at 360 r.p.m. anticlockwise, find the maximum velocity and acceleration of the follower during descent.

15 An epicyclic gear train, as shown in Figure 2, has a sun wheel S of 30 teeth and two planet wheel P – P of 500 teeth. The planet wheels mesh with the internal teeth of a fixed annulus A. The driving shaft carrying the sunwheel, transmit 4 kW at 300 r.p.m The driven shaft is connected to an arm which carries the planet wheels Determine the speed of the driven shaft and the torque transmitted, if the overall efficiency is 95%.
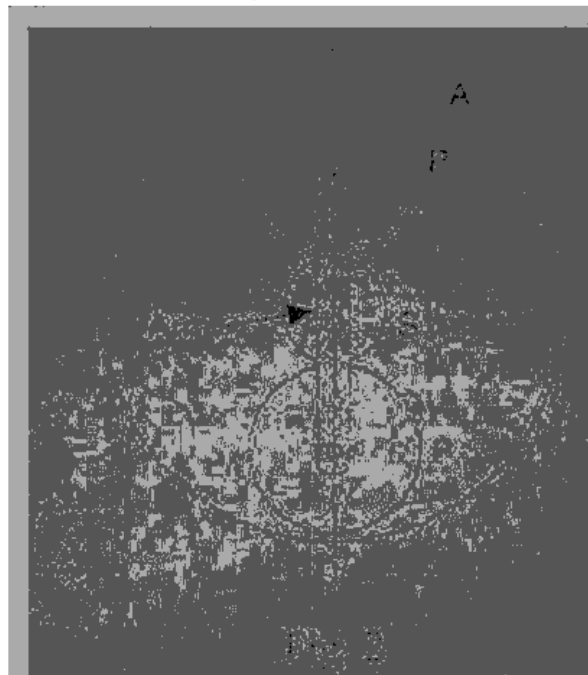
16 A shaft has a number of collars integral with it. The external diameter of the collars is 400 mm and the shaft diameter is 250 mm. If the uniform intensity of pressure is 0.350 N/mm^2 and its coefficient of friction is 0.05, estimate : 1. Power absorbed is overcoming friction when the shaft runs at 105 r.p.m. and carries a load of 150 kN, and 2. Number of collars required.

17 Write short notes on the following with diagrams:
   (a) Peaucellier straight line motion mechanism
   (b) Internal expanding shoe brake
   (c) Comparison of involute and cycloid gear tooth profiles

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