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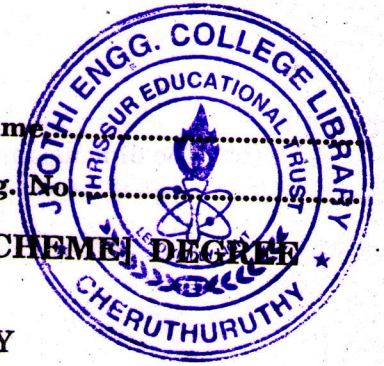
Reg. No.

**FIFTH SEMESTER B.TECH. (ENGINEERING) [14 SCHEME] DEGREE
EXAMINATION, NOVEMBER 2016**

ME 14 504—MECHANICS OF MACHINERY

Time : Three Hours

Maximum : 100 Marks



Part A

Answer any eight questions.

1. Explain the Ackermann steering mechanism.
2. Differentiate between structure and mechanism.
3. In a crank and slotted level quick return mechanism, there is coriolis component of acceleration in the slotte lever. Justify from first principles.
4. Explain the undercutting in cam. How it occurs ?
5. Discuss the period, pitch circle and cam angle.
6. Confer the methods to avoid interference.
7. Explain with a neat sketch the 'sun and planet wheel'.
8. Discuss the various types of the torques in an epicyclic gear train.
9. Write an expression for determining the precision points.
10. Describe the method of designing a four bar mechanism as a function generation.

(8 × 5 = 40 marks)

Part B

Answer all questions.

11. (a) With the help of a neat sketch explain the working of Single slider and double slider crank chain mechanism.

Or

Turn over

- (b) The dimensions of various links in a mechanism, as shown in Figure 1 are as follows :

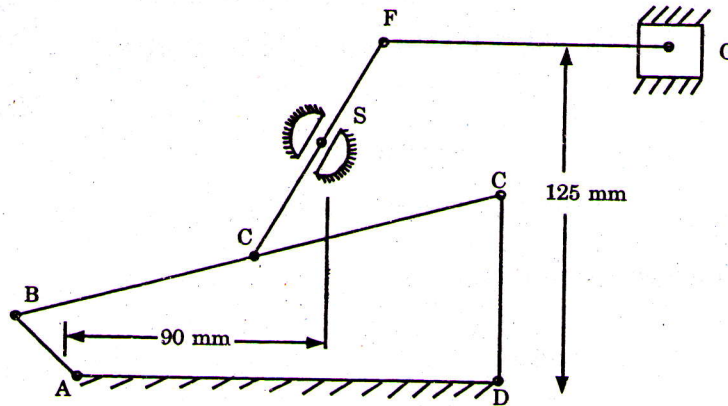


Figure 1

$AB = 25 \text{ mm}$; $BC = 175 \text{ mm}$; $CD = 60 \text{ mm}$; $AD = 150 \text{ mm}$; $BE = EC$; and $EF = FG = 100 \text{ mm}$. The crank AB rotates at 200 r.p.m. When the angle BAD is 135° , determine by instantaneous centre method : (i). Velocity of G , (ii). Angular velocity of EF , and (iii). Velocity of sliding of EF in the swivel block S .

- 12 (a) Draw the displacement, velocity and acceleration diagrams for a follower when it moves with simple harmonic motion. Derive the expression for velocity and acceleration during outstroke and return stroke of the follower.

Or

- (b) A cam rotating clockwise at a uniform speed of 200 r.p.m. is required to move an offset roller follower with a uniform and equal acceleration and retardation on both the outward and return strokes. The angle of ascent, the angle of dwell (between ascent and descent) and the angle of descent is 120° , 60° and 90° respectively. The follower dwells for the rest of cam rotation. The least radius of the cam is 50 mm, the lift of the follower is 25 mm and the diameter of the roller is 10 mm. The line of stroke of the follower is offset by 20 mm from the axis of the cam. Draw the cam profile and find the maximum velocity and acceleration of the follower during the outstroke.

13. (a) A 20° involute pinion with 20 teeth drives a gear having 60 teeth. Module is 8 mm and addendum of each gear is 10 mm.
- State whether interference occurs or not. Give reasons.
 - Find the length of path of approach and arc of approach if pinion is the driver.

Or

- (b) In an epicyclic gear train, as shown in Figure 2, the wheel C is keyed to the shaft B and wheel F is keyed to shaft A. The wheels D and E rotate together on a pin fixed to the arm G. The number of teeth on wheels C, D, E and F are 35, 65, 32 and 68 respectively. If the shaft A rotates at 60 r.p.m. and the shaft B rotates at 28 r.p.m. in the opposite direction, find the speed and direction of rotation of arm G.

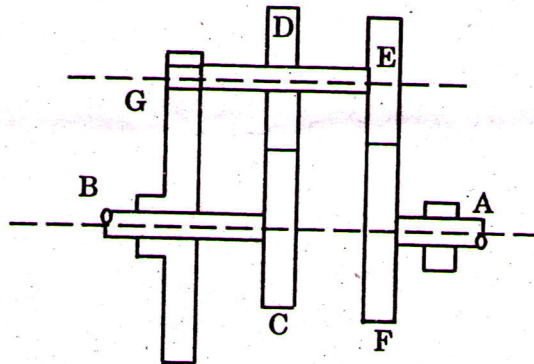


Figure 2

14. (a) A mechanism is to be designed to generate the function $y = x^{0.8}$ for the range $1 \leq x \leq 3$, using three precision points. Find the three values of x and y .

Or

- (b) Sketch and explain the hydraulic drive of a horizontal shaper. Also, discuss the working of a crank and slotted link mechanism.

(4 × 15 = 60 marks)