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Question Paper Code : 80838

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Third Semester

Mechanical Engineering

ME 2203/10122 ME 404/080120010/ME 35 — KINEMATICS OF MACHINERY

(Regulations 2008/2010)

(Common to PTME 2203 for B.E. (Part - Time) Third Semester — Regulations 2009)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Determine the number of freedom of the mechanism shown in the fig. 1:

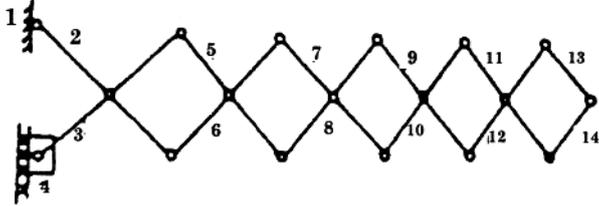


Fig. 1

2. What is the significance of degrees of freedom of a Kinematic chain when it functions as a mechanism? Give examples.
3. State the advantages of cam mechanisms over linkage mechanisms.
4. Briefly write about undercutting in cam.
5. Why sometimes the axes of translating roller followers in cam follower mechanisms are offset from the axis of cam rotating?
6. Define tangential cam.
7. List down the common forms of gear teeth.
8. Sketch the configuration of a reverted gear train.

9. Define anti -friction bearing.
10. Differentiate multiplate clutch and cone clutch.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Sketch and explain the inversion of a 4 bar mechanism, all the four pairs are turning pairs. (10)
- (ii) Sketch and explain any two types of straight line motion generating mechanism. (6)

Or

- (b) (i) Explain mechanical advantage and transmission angle related to four bar mechanism. (8)
- (ii) Explain the Ratchet and Escapism mechanism with neat diagram. (8)
12. (a) Draw the velocity diagram for the mechanism shown in the fig 12(a). Determine the velocity of the ram E for the given position, if crank OA rotates uniformly at 150 rpm. OA = 150 mm, AB = 550 mm, BE = 350 mm, AC = 450 mm and DC = 500 mm. (16)

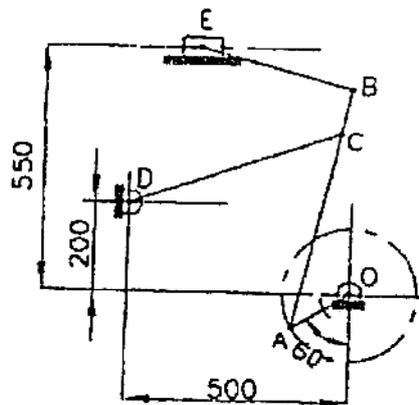


Figure – 12 (a)

Or

- (b) A link AB of a four bar linkage ABCD revolves uniformly at 120 rpm in a clockwise direction Find the angular acceleration of links BC, CD and acceleration of point E in link BC. Given: AB = 7.5 cm, BC = 17.5 cm, EC = 5 cm, CD = 15 cm, DA = 10 cm and $\angle BAD = 90^\circ$. (16)

13. (a) A cam operates on offset roller follower. The least radius of the cam is 50 mm, roller diameter is 30 mm, and offset is 20 mm, the cam rotates at 360 rpm. The angle of ascent is 48° , angle of dwell is 42° , and angle of descent is 60° . The motion is to be SHM during ascent and uniform acceleration and deceleration during descent. Draw the cam profile. (16)

Or

- (b) (i) A flat faced mushroom follower is operated by a symmetrical cam with circular arc flank and nose profile the axis of tappet passed through the cam axis. Total angle of action is 162° , lift 10 mm and base circle diameter 40 mm. period of acceleration is half the period of retardation during the lift. The cam rotates at 1200 rpm. Determine
- (1) The nose and flank radii and
 - (2) The maximum acceleration and retardation during lift. (12)
- (ii) List the various methods to be used to reduce the pressure angle. (4)
14. (a) Draw the neat diagram of a portion of spur gear and explain elaborately the various terms used in the study of gears. (16)

Or

- (b) An epicyclic gear train shown in Fig. 14 (b). The number of teeth on A and B are 80 and 200 respectively. Determine the speed of the arm 'a' :
- (i) If A rotates at 100 rpm clockwise and B at 50 rpm anticlockwise (8)
 - (ii) If A rotates at 100 rpm clockwise and B is stationary. (8)

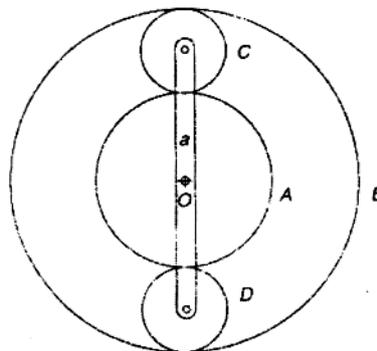


Figure – 14 (b)

15. (a) The power transmitted between two shafts 3.5 metres apart by a cross belt drive round the two pulleys 600 mm and 300 mm in diameters, is 6 kW. The speed of the larger pulley (driver) is 220 r.p.m. The permissible load on the belt is 25 N/mm which is 5 mm thick. The coefficient of friction between the smaller pulley surface and the belt is 0.35. Determine: 1. necessary length of the belt; 2. width of the belt, and 3. necessary initial tension in the belt. (16)

Or

- (b) A multiplate clutch has three pairs of contact surfaces. The outer and inner radii of the contact surfaces are 100 mm and 50 mm respectively. The maximum axial spring force is limited to 1 kN. If the coefficient of friction is 0.35 and assuming uniform wear, find the power transmitted by the clutch at 1500 r.p.m. (16)
