

SECTION-B

2. In Fig. 1. what happens when link 3 is fixed? Draw the figure of the mechanisms so formed.

Where

Link 1 → crank

Link 2 → connecting rod

Link 3 → slider

Link 4 → cylinder

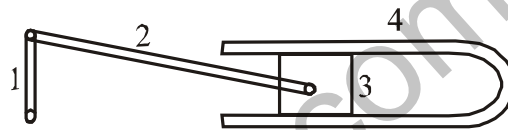


Fig.1

3. The crank of a reciprocating engine revolves at a uniform speed of 310 *r.p.m.* in clockwise direction. The crank and connecting rod are 15 cm and 65 cm long respectively. Find the velocity and acceleration of the piston when the crank turns 30° from I.D.C.
4. The angle between the axes of two shafts connected by universal joint is 30° . The driving shaft rotates at uniform speed of 240 *r.p.m.* The driven shaft carries a steady load of 9 kW. Calculate the radius of gyration of the flywheel of the driven shaft having mass 50 kg and the output torque of the driven shaft does not vary by more than 20% of the input shaft.
5. The width of a belt is 15 cm and the maximum tension per cm width is not to exceed 140 N. The ratio of tensions on two sides is 2.25, determine the power that can be transmitted. The diameter of the driver is 1.05 m and it makes 220 *r.p.m.*
6. A single plate clutch with both sides effective has outer and inner diameters 300 mm and 200 mm respectively. The maximum intensity of pressure at any point in the contact surface is not to exceed 10^5 N/m^2 . If the coefficient of friction is 0.30, determine the power transmitted by a clutch at a speed 2500 *r.p.m.*

SECTION-C

7. A steam engine develops 300 kW at 120 *r.p.m.* The coefficient of energy as found from the turning moment diagram is to be 0.1 and the fluctuation of speed is to be kept within ± 1 percent of the mean speed. Find the mass of the flywheel required, If the radius of gyration is 2 m.
8. In a Hartnell governor, the radius of ball is 60 mm at the minimum speed of 300 *r.p.m.* The length of the ball arm is 140 mm and the sleeve arm is 90 mm. The mass of each ball is 5 kg and the sleeve is 8 kg. The stiffness of the spring is 32715 N/m. Determine :
 - (i) speed when sleeve is lifted by 50 mm
 - (ii) initial compression of spring
 - (iii) governor effort and
 - (iv) power
9. An offset translating roller follower is driven by a cycloidal motion cam rotating at 600 *r.p.m.* The maximum follower rise is 3 cm during 150° of cam rotation. If the amount of offset is 0.5 cm, the pressure angle 14° for the offset follower at a cam angle of 60° , find prime circle radius.