

II B.Tech II Semester Regular/Supplementary Examinations, May 2010
MECHANISMS AND MECHANICAL DESIGN
Aeronautical Engineering

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
 All Questions carry equal marks

- Compare the performance of Knife-edge, roller and mushroom followers.
 - Define: base circle, pitch circle, trace point, pitch curve and pressure angle. [8+8]
- What are the straight line mechanisms? How they are classified?
 - With neat diagram explain Elliptical trammel mechanism. [8+8]
- Find the velocity of point C and the angular velocity of link 3 of the push-link mechanism shown in the figure 3. Link 2 is the driver and rotates at 8 rad/s ccw. Use instant centre method. [16]

$O_2A = 150 \text{ mm}$, $AB = O_4B = 250 \text{ mm}$, $O_2O_4 = 75 \text{ mm}$, $AC = 300 \text{ mm}$, $BC = 100 \text{ mm}$

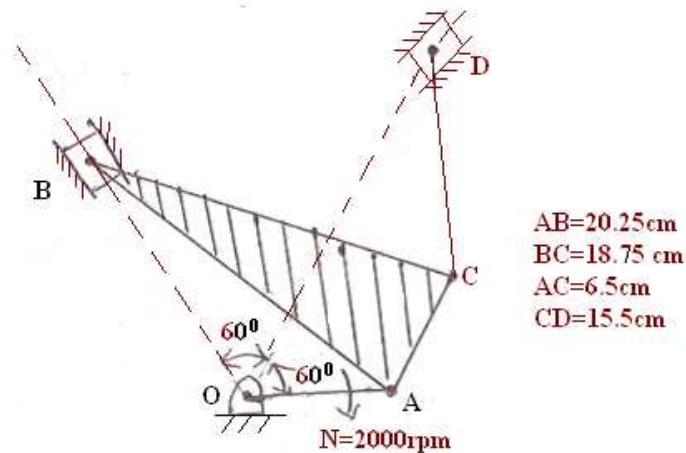


Figure 3

- Two 20° involute spur gears have a module of 6 mm. The larger wheel has 36 teeth and the pinion 16 teeth. If the addendum be equal to one module, will the interference occur? What will be the effect if the number of teeth on the pinion is reduced to 14? [16]
- A tangent cam operating the suction valve of a spark ignition engine through a reciprocating roller follower has the following particulars:

Base circle diameter = 20mm

Distance between nose circle and axis of the cam = 8.5mm

Nose radius = 7mm

Follower diameter = 25mm
Speed of the engine = 2000 r.p.m.

The valve opens 23° E and closes 73° L. Determine

- The angle of action of the cam
- Total lift of the valve
- The maximum velocity during outstroke and the angular position of the crank.
- The acceleration at the beginning of the operating at the valve.
- The acceleration just before the point the valve is fully open. [16]

6. In the mechanism shown in figure 6. link AB rotates clockwise at a speed of 240 r.p.m. At the instant shown, find the velocity and acceleration of slider 'C' as well as those of slider 'E'. AB = 50 mm, BC = 120 mm, BD = DC = 60 mm, DE = 80 mm. [16]

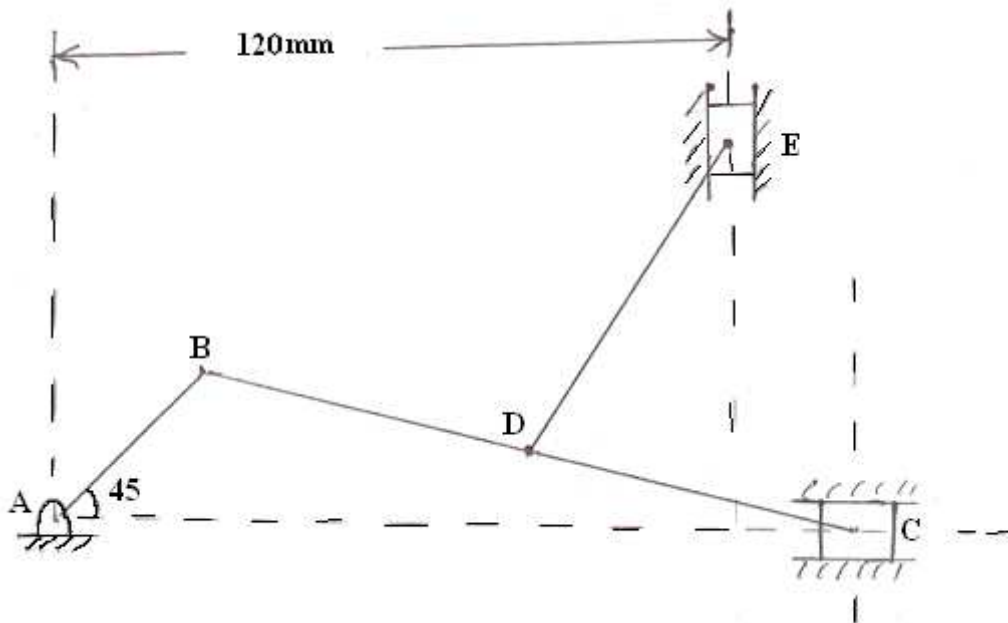


Figure 6

- A vertical single cylinder engine has a cylinder diameter of 250 mm and a stroke of 450 mm. The reciprocating parts have a mass of 180 kg. The connecting rod is 4 times the crank radius and the speed is 360 rpm. When the crank has turned through an angle of 45° from top dead center, the net pressure on the piston is 1.05 N/m^2 . Calculate the effective turning moment on the crank shaft for this position. [16]
- A bumper, consisting of two helical steel springs of circular section, brings to rest a railway wagon of mass 1500Kg, and moving at 1.2m/s. While doing so, the springs are compressed by 150mm. The mean diameter of the coils is 6 times the wire diameter. The permissible shear stress is 400 MPa. Determine

Code No: 07A42104

R07

Set No. 3

- (a) maximum force on each spring
- (b) wire diameter of the spring
- (c) mean of diameter of the coils, and
- (d) number of active coils. Take $G=0.84 \times 10^5$ MPa. [16]
