

DRONACHARYA GROUP OF INSTITUTIONS, GREATER NOIDA
Mechanical Engineering Department

Unit II

Q-1 Find an expression for tangential acceleration and for radial acceleration when a body is moving in a circular path. What will happen to these accelerations if:

- (i) Body is rotating with uniform angular velocity, and
- (ii) Body is moving on a straight path?

Q-2 Explain Klein's construction for finding acceleration of links in slider crank mechanism.

Q-3 What do you mean by Corolis component of acceleration? When will it exist? Prove that this component of acceleration is equal to $2v\omega$. How will you find the direction of Corolis component of acceleration?

Q-4 In a slider mechanism the crank OA is 50 cm long and is rotating at a uniform speed of 300 rpm the length of connecting rod AB is 2 meter using Klien's construction. Determine the acceleration of a point C on the connecting rod (AC = 60 cm) when crank makes an angle of 45° with the line of stroke.

Q-5 The crank of the slider mechanism as shown in figure 1, rotates at 20 rpm anticlockwise and gives motion to the sliding blocks B and D. The dimensions of the various links are OA = 300 mm AB = 1200mm BC = 450 mm and CD = 450 mm. Determine the linear acceleration of the block D

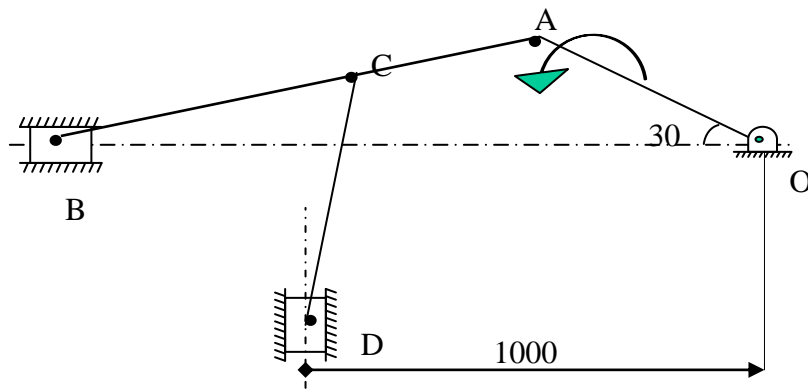


Figure 1

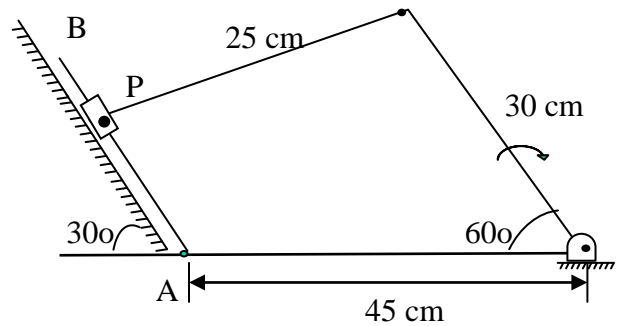


Figure 2

Q-6 In the mechanism shown in figure 2, the block P reciprocates along the fixed line AB and the crank has a uniform speed of 250 rpm. For the given configuration, determine the velocity and acceleration of point P.

Q-7 An engine mechanism shown in fig 3, has a crank length of 0.1 m and connecting rod 0.3 m long with centre of gravity G; 0.1 m from end B. The crank shaft has a speed of 75 rad / sec and an angular acceleration of 1200 rad / sec². Find acceleration of point G and angular acceleration of connecting rod.

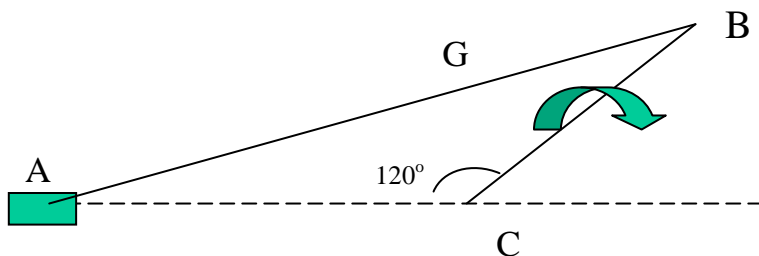


Figure 3

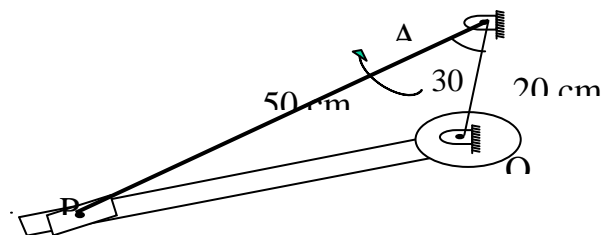


figure 4

Q-8 Figure 4 shows a rotating cylinder engine mechanism. Determine for the given configuration, the angular acceleration of the cylinder about O. The link AP rotates uniformly at 200 rpm in clockwise sense.

Q-9 What do you mean by straight line mechanism? Name different mechanisms which are used for exact straight line motion. Describe the working of one of the exact straight motion mechanisms with neat sketch.

Q-10 What is a Hooke's joint? With a neat sketch, describe the working of Hook's joint. Also show that for a Hooke's joint, $\tan \theta = \cos \alpha \tan \phi$

Where α = angle of inclination of the driven shaft with driving shaft, and ϕ and θ are angles turned by driven and driving shafts at any instant.

Q-11 What is the condition for correct steering? Sketch and show the two main types of steering Gears and discuss their relative advantages.

Q-12 What are the different types of approximate straight line motion mechanism ? Explain any one of them with neat sketch.

Q-13 Describe the working of a Davis steering mechanism.

Q-14 In a Davis steering gear, the distance between pivots of the front axle is 1.2 meter and the wheel base is 2.5 m. find the inclination of the track arm to the longitudinal axis of the car, when it is moving along a straight path.

Q-15 Sketch a pantograph, explain its working and show that it can be used to reproduce to an enlarged scale a given drawing.

Q-16 Figure 5 shows an arrangement of copying mechanism. A circle of diameter 9 cm is to be copied to a reduced scale. Determine the positions of scribing pens and ratio of reduction obtained.

OA = ED = OA = 10 cm ; OE = AD = 2 cm; EC = DB = 6 cm; BP = 4 cm

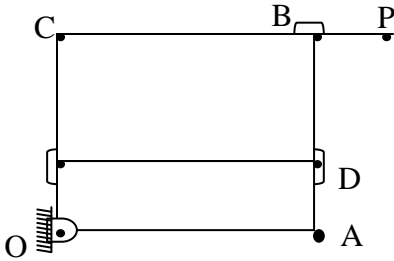


Figure 5

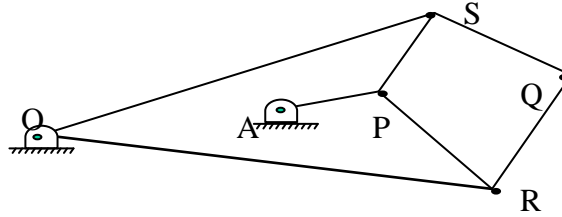


Figure 6

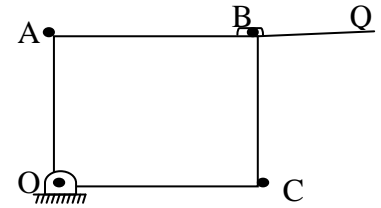


Figure 7

Q-17 Figure 6 shows Paucelliers mechanism. Describe the path of the tracing point Q.

OA = AP = PS = SQ = QR = RP = 15 CM, OR = OS = 40 cm.

Q-18 Figure 7 shows a pantograph mechanism. Where will be the pen placed to copy a diagram to a reduced scale? What will be the reduction ratio of areas?

Q-19 A rigid link is rotating anticlockwise about point A with angular velocity ω and angular acceleration α . Describe the method of drawing the acceleration diagram and finds the total acceleration of B with respect to A. When link rotates with uniform angular velocity, what will be the total acceleration

Q-20 What is an acceleration centre of a link? What is its use? Explain.

Q-21 Sketch a quick return motion of the crank and slotted lever type and explain the procedure of drawing the velocity and acceleration diagram for any given configuration of the mechanism.