SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

Department of Mechanical Engineering

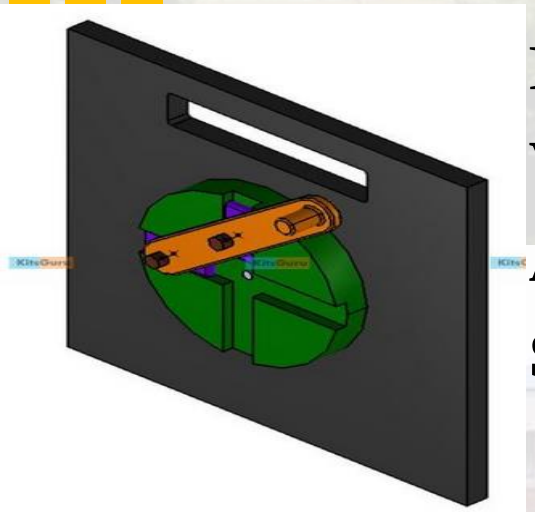
Kinematics of Machinery

UNIT – II

KINEMATICS OF LINKAGE MECHANISMS

TOPIC-3

SLIDER CRANK MECHANISMS(SCM)



SOURCE: QUORA

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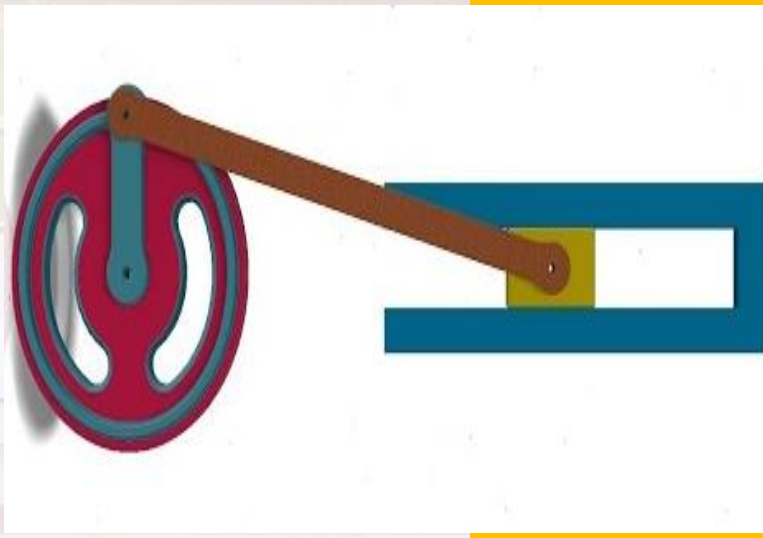
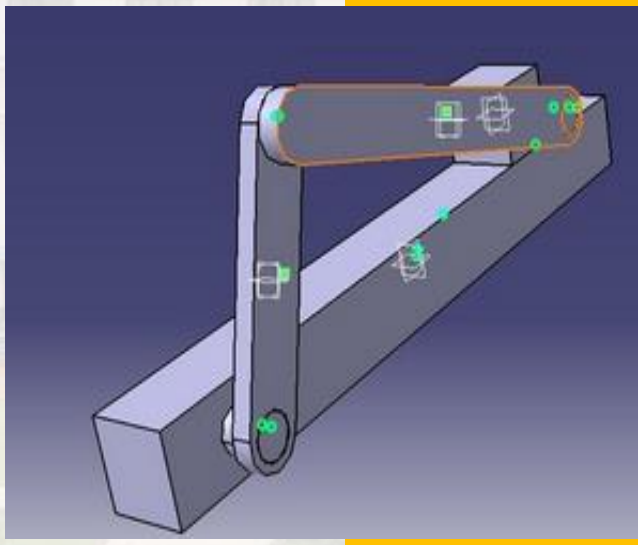


SOURCE: QUORA

SLIDER CRANK MECHANISMS



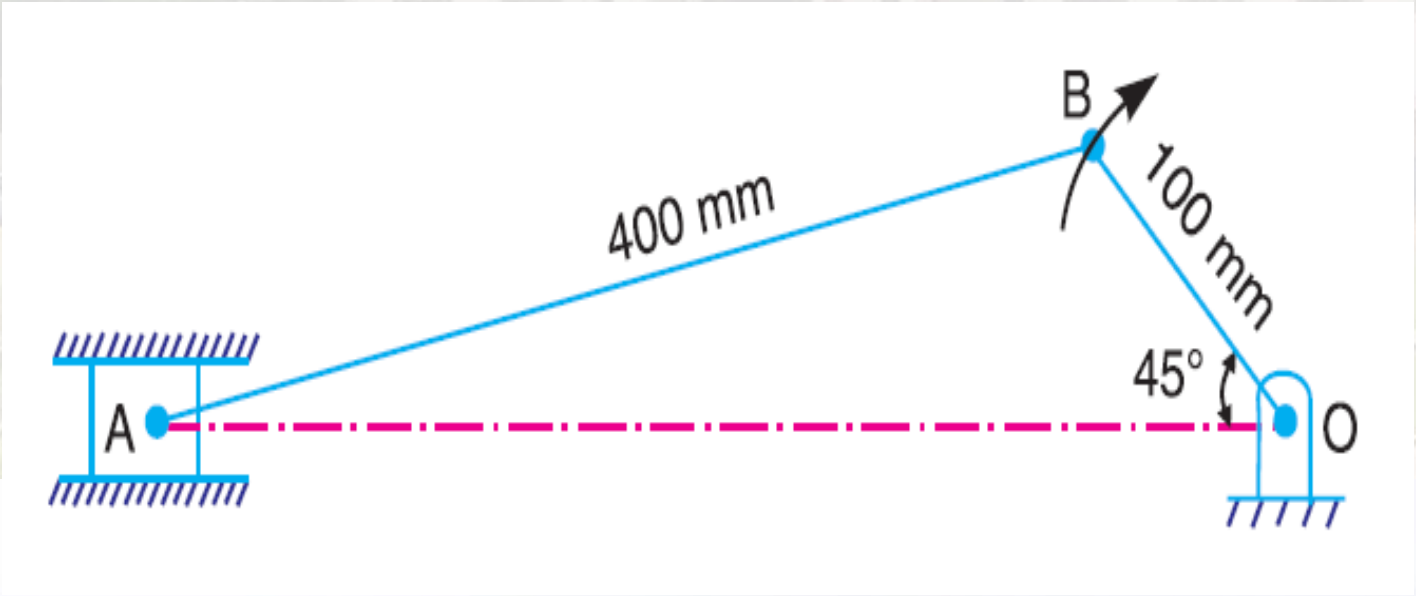
SOURCE: GRABCAD

Locate all the instantaneous centres of the slider crank mechanism as shown in Figure 1 slide number 3. The lengths of crank OB and connecting rod AB are 100 mm and 400 mm respectively. If the crank rotates clockwise with an angular velocity of 10 rad/s,

find: 1. Velocity of the slider A, and

2. Angular velocity of the connecting rod AB.

CONSTRUCTION OF VELOCITY METHOD

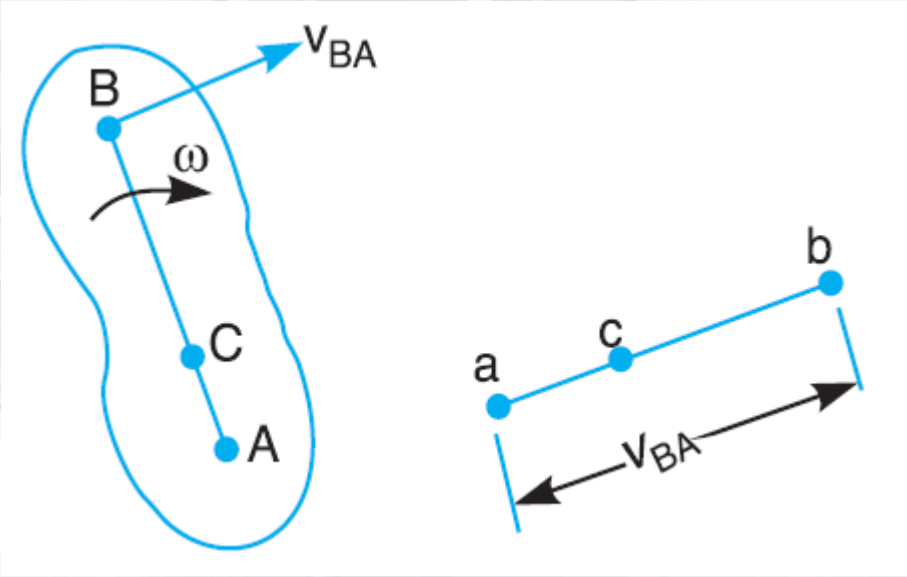


SOURCES: KHURMI R S

FIGURE 1

MOTION OF A LINK

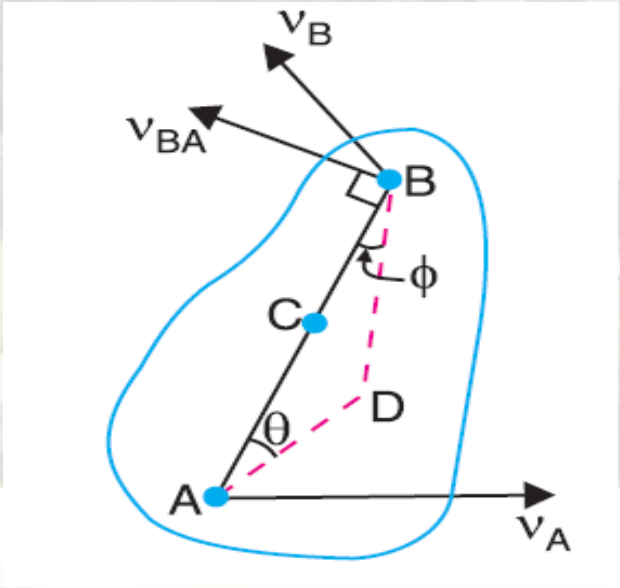
velocity of any point on a link with respect to another point on the same link is always perpendicular to the line joining these points on the configuration (or space) diagram.



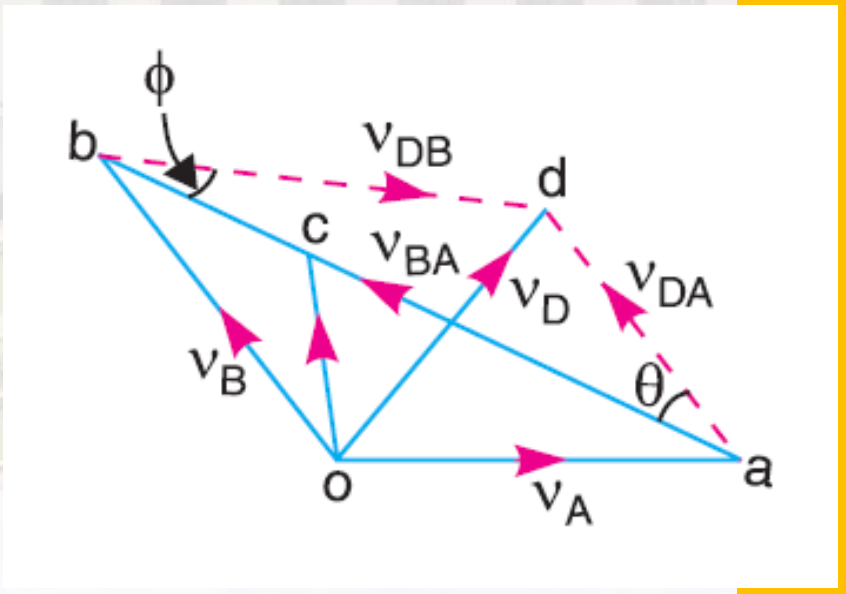
SOURCE: KHURMI R S

MOTION OF A LINK

VELOCITY OF A POINT ON A LINK BY RELATIVE VELOCITY METHOD



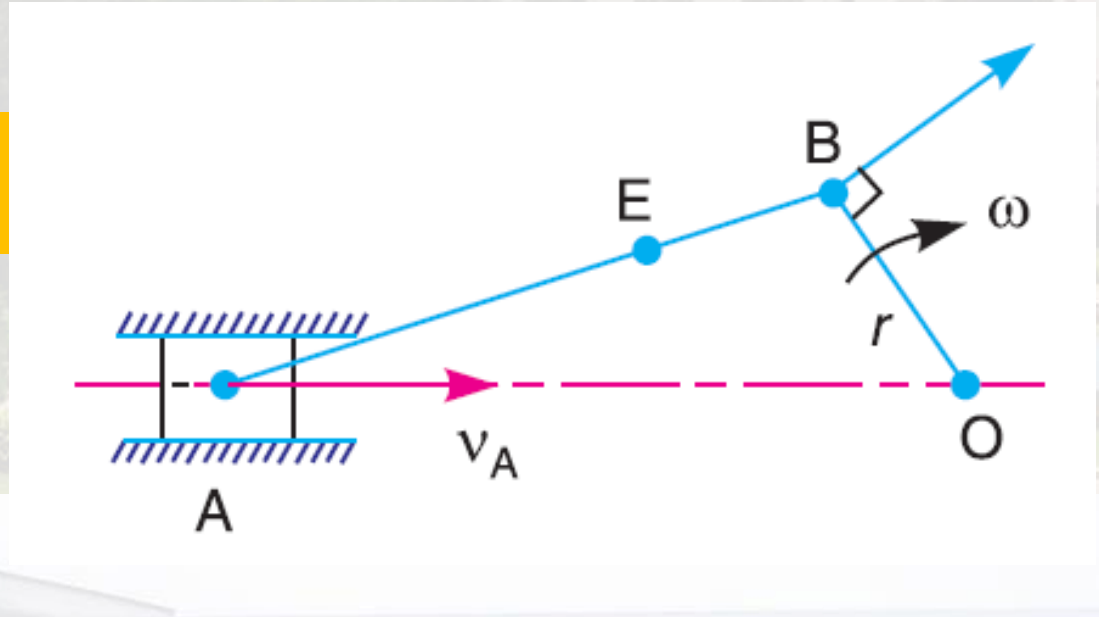
SOURCE: KHURMI R S

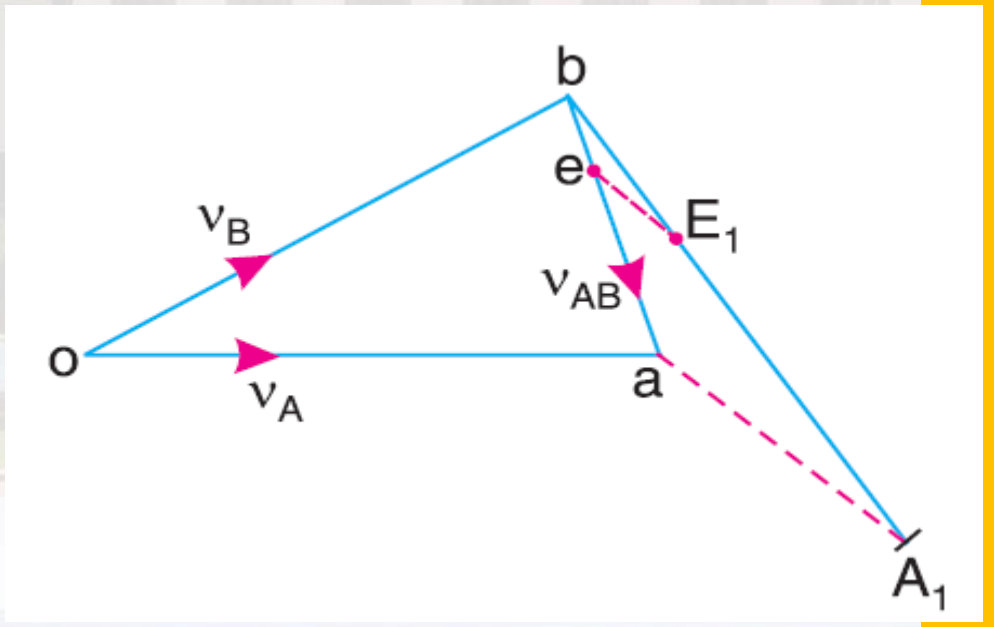


MOTION OF POINTS ON A LINK

VELOCITY DIAGRAM

VELOCITIES IN SLIDER CRANK MECHANISM





SOURCE: KHURMI R S

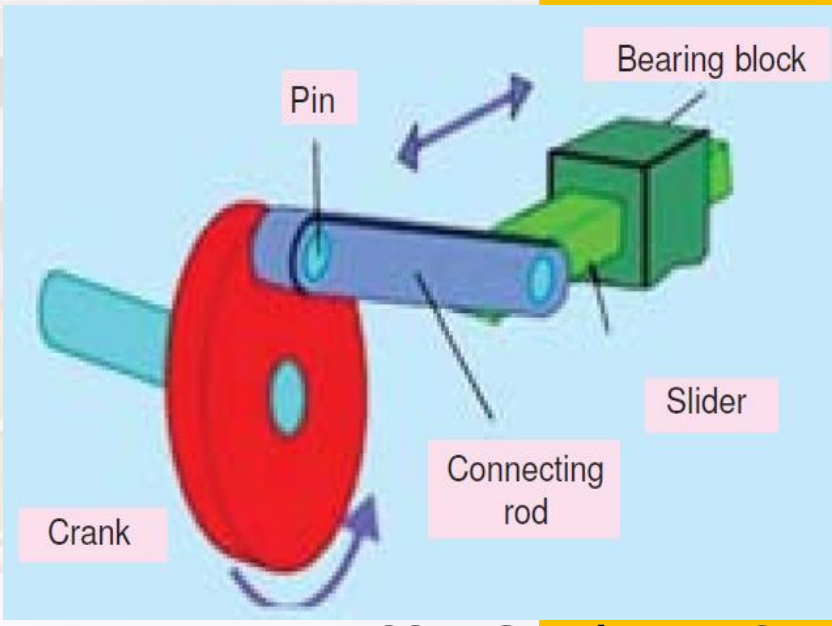
SLIDER CRANK MECHANISM

RUBBING VELOCITY AT A PIN JOINT

Given : ω_{OB} = 10 rad/ s; OB = 100 mm = 0.1 m

We know that linear velocity of the crank OB,

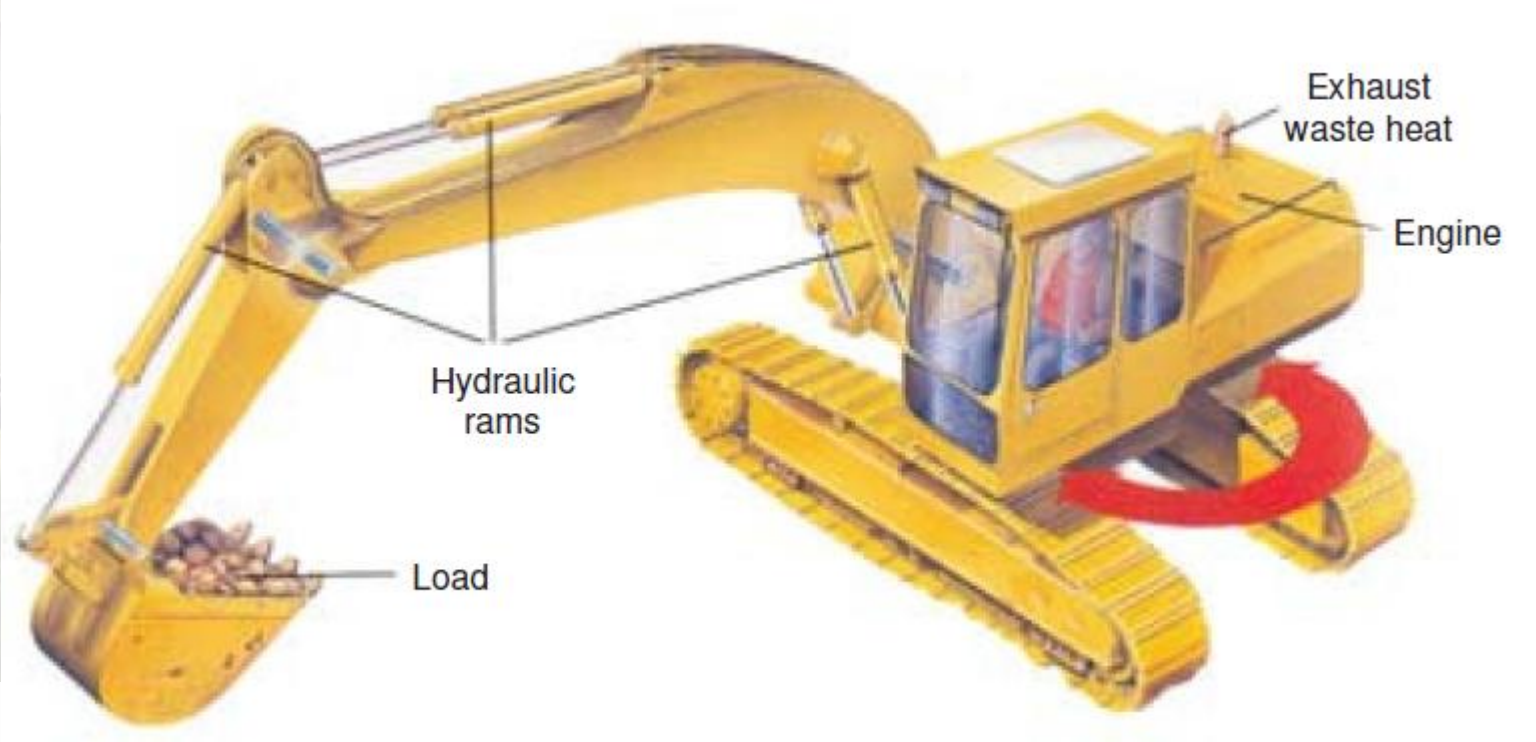
$$V_{OB} = V_B = \omega_{OB} \times OB = 10 \times 0.1 = 1 \text{ m/s}$$



SOURCE: Khurmi R S

BOARD USAGE ALSO

SLIDER CRANK MECHANISMS



The above picture shows a digging machine, Note : This picture is given as additional information and is not a direct example of the complete slides

RUBBING VELOCITY AT A PIN JOINT

Consider two links OA and OB connected by a pin joint at O as shown in Figure 1 in Slide Number-7.

Let ω1 = Angular velocity of the link OA or the angular velocity of the point A with respect to O.

ω2 = Angular velocity of the link OB or the angular velocity of the point B with respect to O, and

r = Radius of the pin.

BOARD USAGE ALSO

RUBBING VELOCITY AT A PIN JOINT

According to the definition,
Rubbing velocity at the pin joint O
= $(\omega 1 - \omega 2)$ r, if the links move in the same direction
= $(\omega 1 + \omega 2)$ r, if the links move in the opposite direction

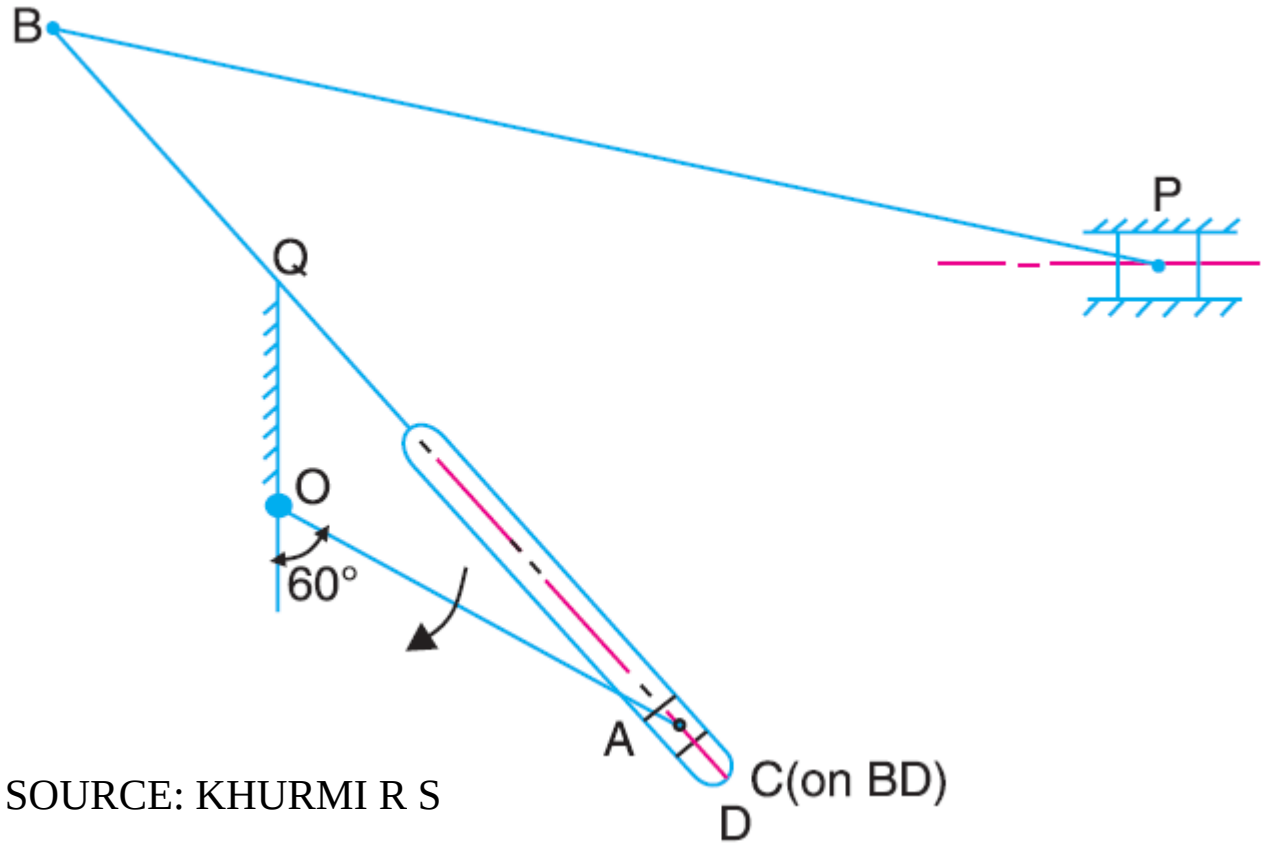
Rubbing velocity at the pin joint = $\omega.r$
where ω = Angular velocity of the turning member, and
r = Radius of the pin.

BOARD USAGE ALSO

ASSESMENT QUESTIONS

1. In a Whitworth quick return motion mechanism, as shown in Figure 1 in slide number 12 , the dimensions of various links are as follows :
OQ = 100 mm ; OA = 200 mm ; BQ = 150 mm and BP = 500 mm.
If the crank OA turns at 120 r.p.m. in clockwise direction and makes an angle of 120° with OQ,
Find : 1. velocity of the block P, and 2. angular velocity of the slotted link BQ.

ASSESMENT QUESTIONS



SOURCE: KHURMI R S

FIGURE: 1

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