SNS COLLEGE OF TECHNOLOGY

(AN AUTONOMOUS INSTITUTION)

Department of Mechanical Engineering

Kinematics of Machinery

UNIT – II

KINEMATICS OF LINKAGE MECHANISMS

TOPIC-4

ACCELERATION DIAGRAM(AD)

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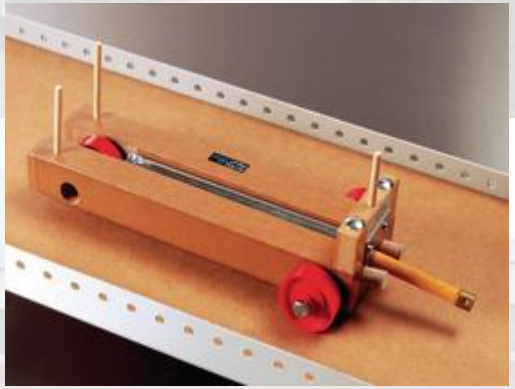

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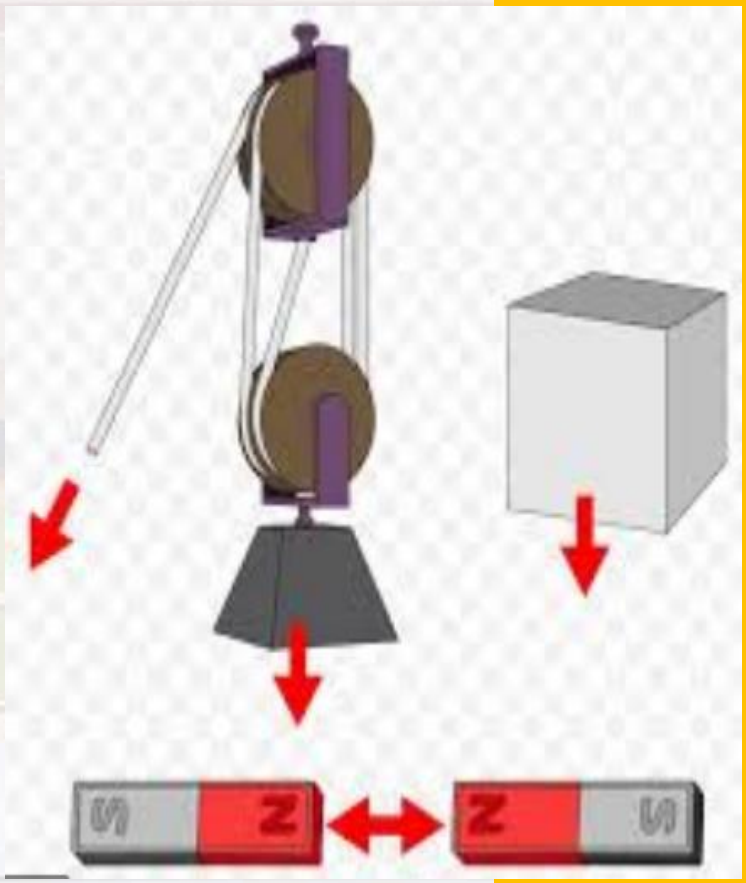
ACCELERATION DIAGRAM

- Acceleration Diagram for a Link.
- Acceleration of a Point on a Link.
- Acceleration in the Slider Crank Mechanism.
- Corollas Component of Acceleration.



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ACCELERATION DIAGRAM FOR A LINK

- Consider two points A and B on a rigid link as shown in Figure 1.
- Let the point B moves with respect to A, with an angular velocity of rad/s and let rad/s2 be the angular acceleration of the link AB.

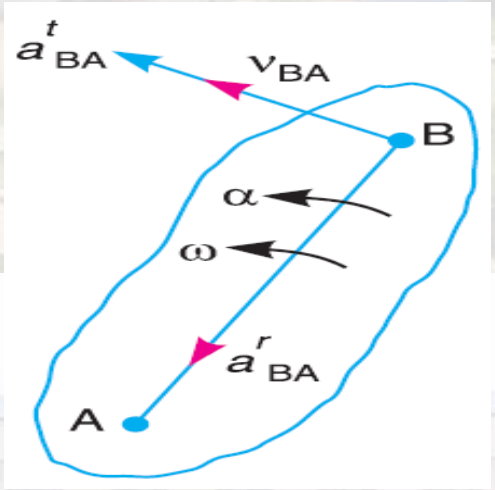


FIGURE 1

SOURCES: KHURMI R S

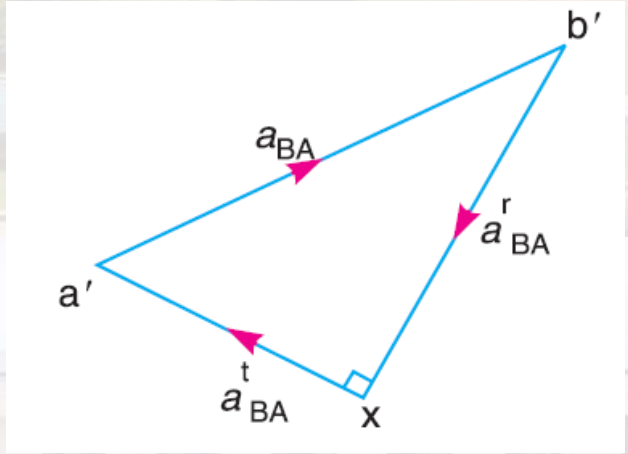
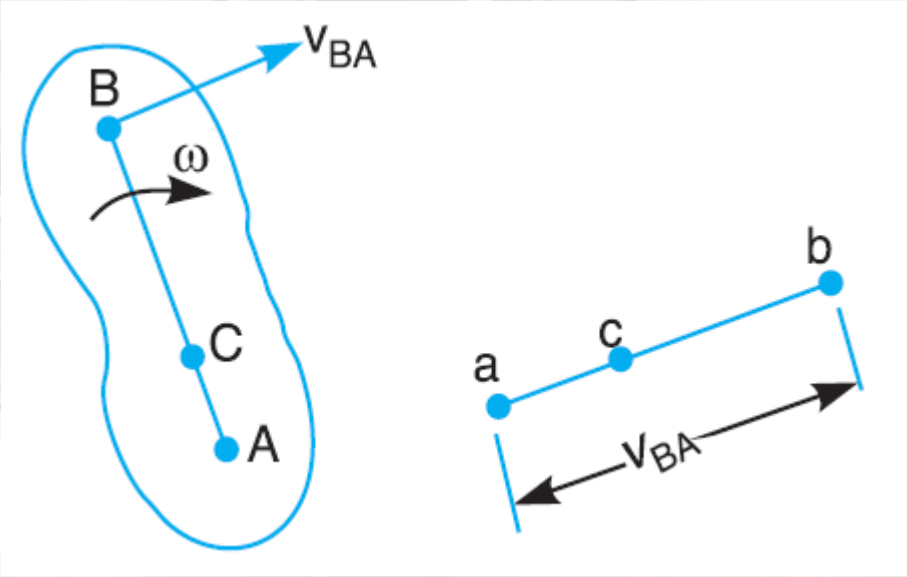


FIGURE 2

MOTION OF A LINK

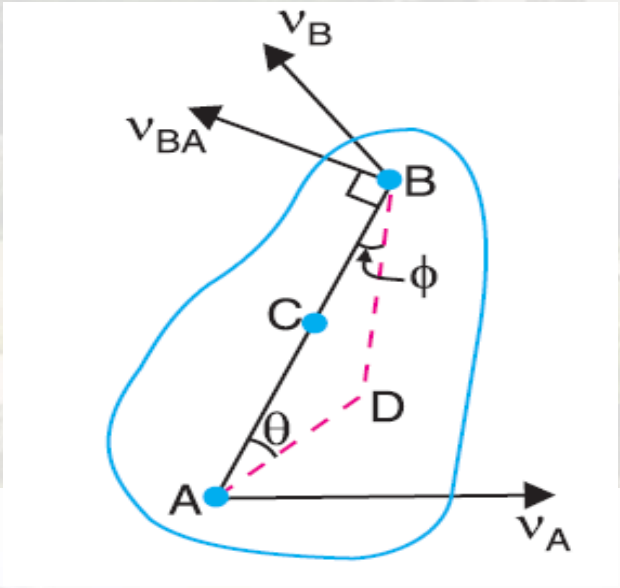
velocity of any point on a link with respect to another point on the same link is always perpendicular to the line joining these points on the configuration (or space) diagram.



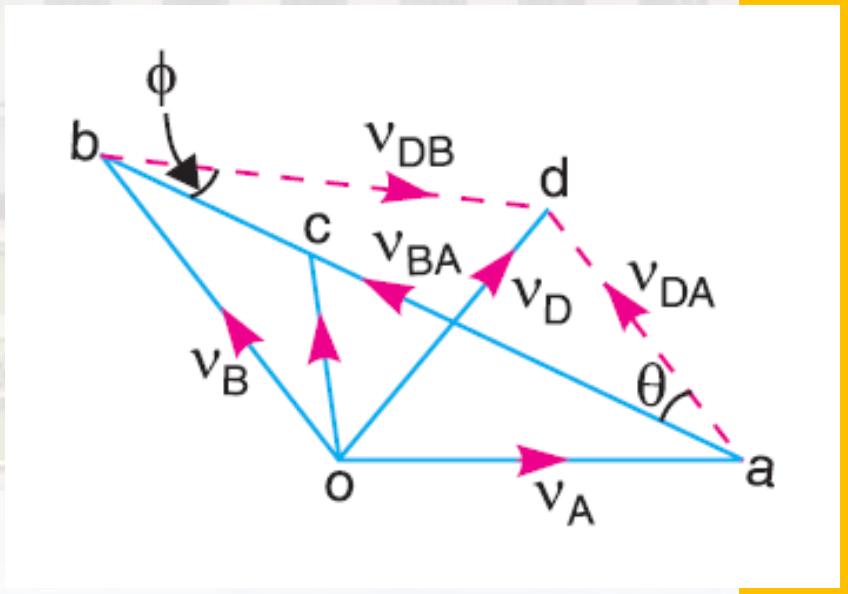
SOURCE: KHURMI R S

MOTION OF A LINK

ACCELERATION DIAGRAM FOR A LINK



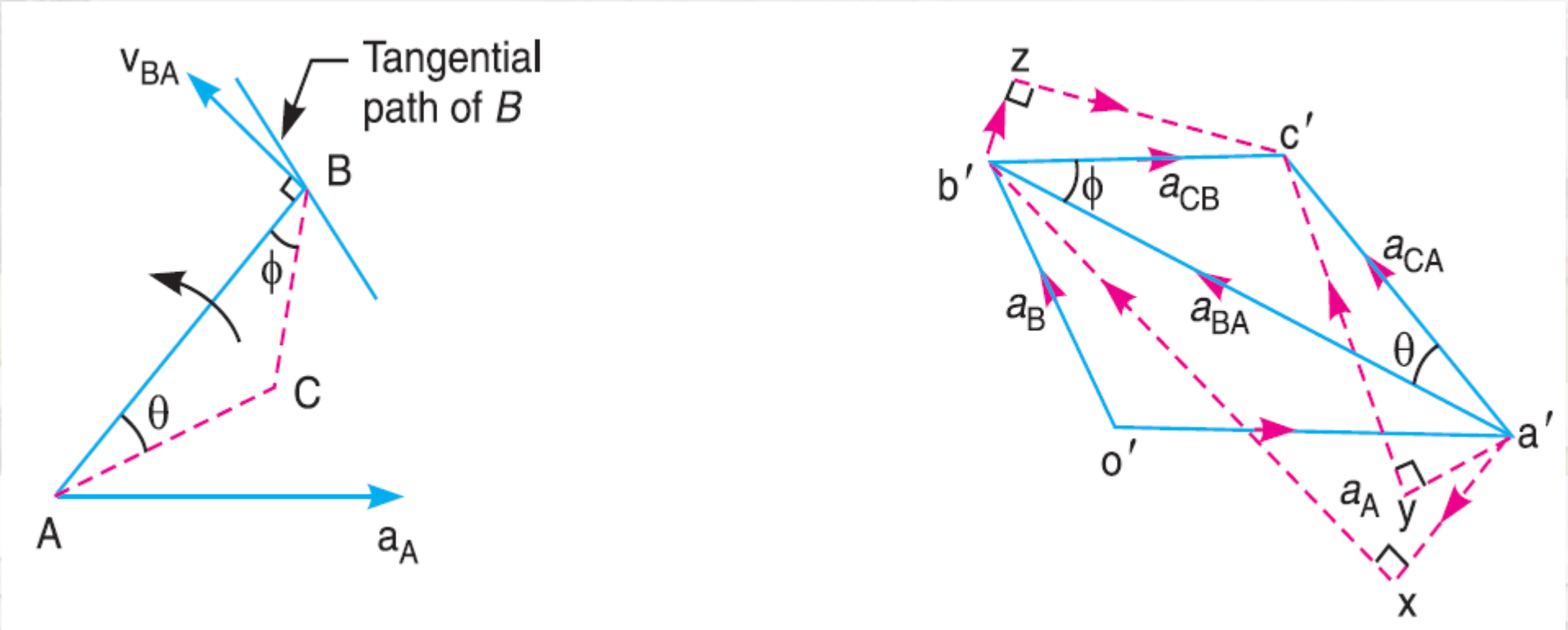
SOURCE: KHURMI R S



MOTION OF POINTS ON A LINK

ACCELERATION DIAGRAM

ACCELERATION OF A POINT ON A LINK



ACCELERATION OF A POINT ON A LINK

ACCELERATION IN THE SLIDER CRANK MECHANISM

- A slider crank mechanism is shown in Figure in **slide number 9**.
- Let the crank OB makes an angle Θ with the inner dead centre (I.D.C) and rotates in a clockwise direction about the fixed point O with uniform angular velocity ω_{BO} rad/s.

BOARD USAGE ALSO

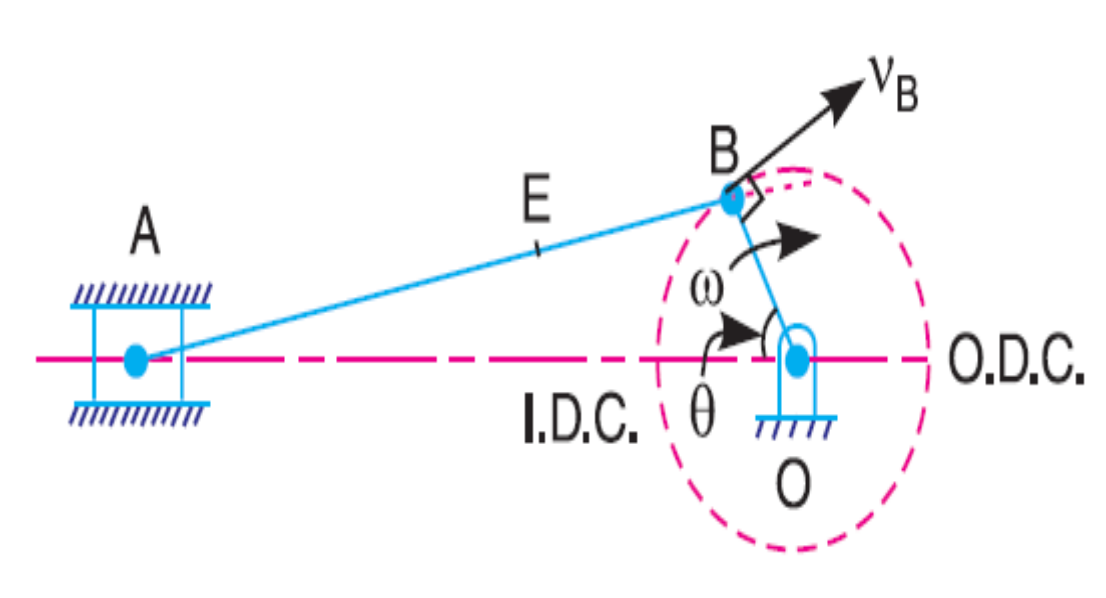
ACCELERATION IN THE SLIDER CRANK MECHANISM

Velocity of B with respect to O or velocity of B (because O is a fixed point),

$V_{BO} = V_B = \omega_B . BO$,acting tangentially at B.

Note : A point at the end of a link which moves with constant angular velocity has no tangential component of acceleration.

ACCELERATION IN THE SLIDER CRANK MECHANISM



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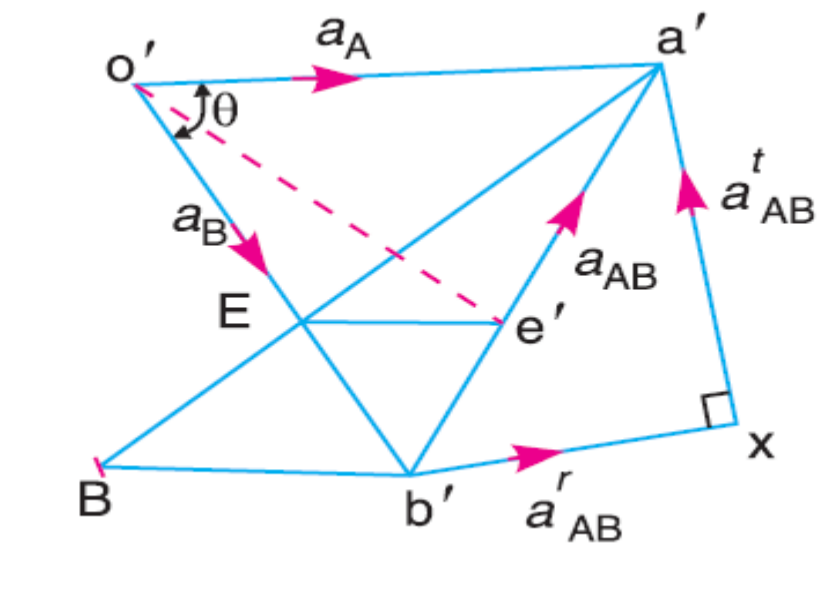

SLIDER CRANK MECHANISM

ACCELERATION DIAGRAM

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. The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine :
   a. linear velocity and acceleration of the midpoint of the connecting rod, and
   b. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.

ASSESMENT QUESTIONS

SOURCE: KHURMI R S

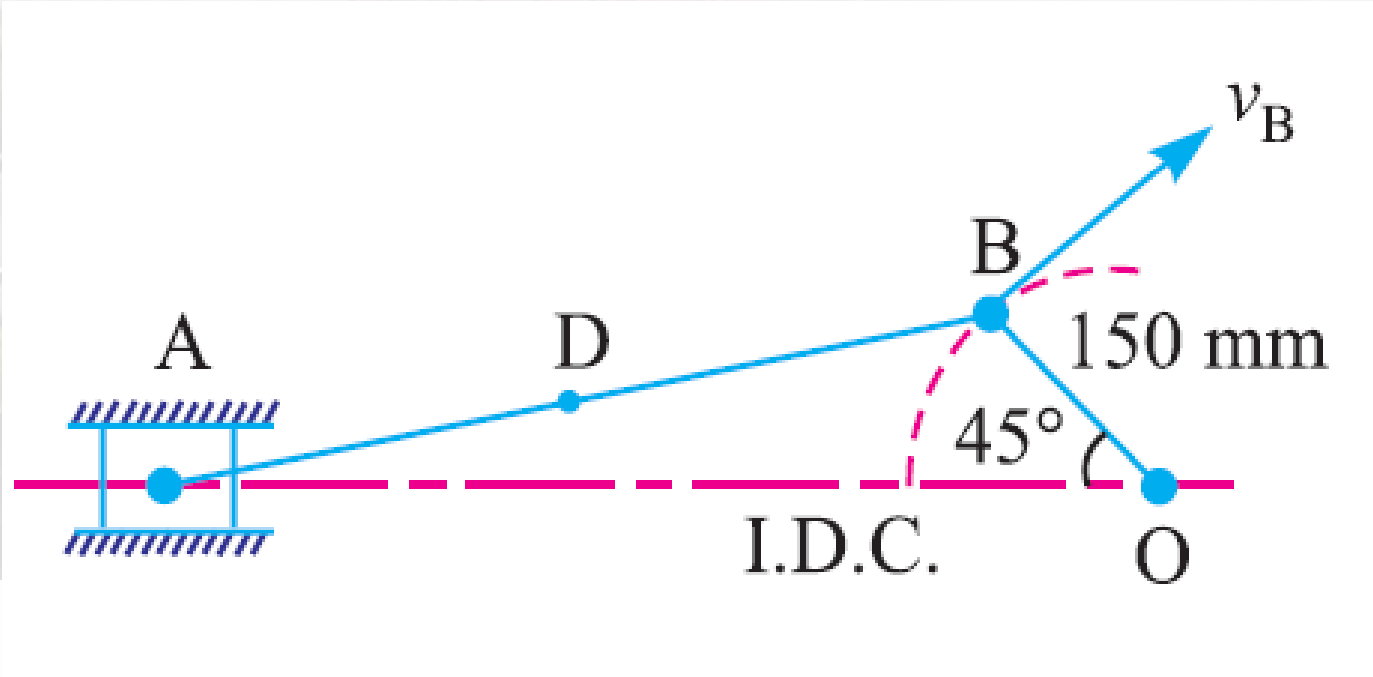

FIGURE: 1

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