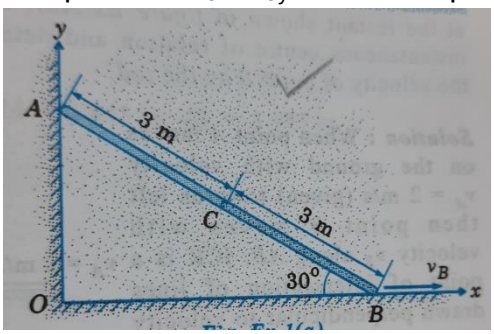
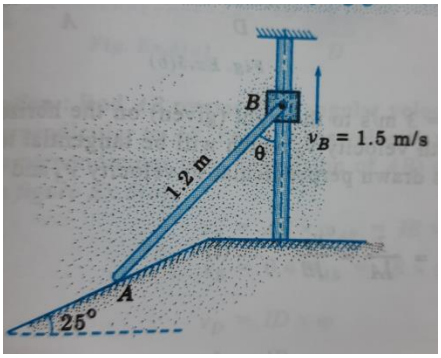
Class work problems on Module 2.2 - 2024

1. Fig. shows a ladder AB = 6 m resting against a vertical wall at A and horizontal ground at B. If the end B of the ladder is pulled towards right with a constant velocity v_B = 4 m/s, find (i) instantaneous centre of rotation of the ladder (ii) angular velocity of the ladder at this instant (iii) velocity v_A of the end A of the ladder (iv) velocity components v_{Cx}, v_{Cy} of the mid-point C of the ladder.



2. Fig. shows a collar B which moves upwards with constant velocity of 1.5 m/s. At the instant when θ = 50^0, determine (i) the angular velocity of rod pinned at B and freely resting at A against 25^0 sloping ground and (ii) the velocity of end A of the rod.



3. Block D shown in fig. moves with a speed of 3 m/s. Determine angular velocity of links BD and AB and velocity of point B at the instant shown. Take length of AB = BD = 0.4 m.

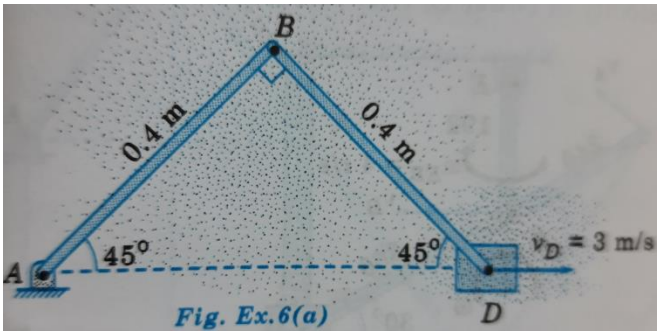
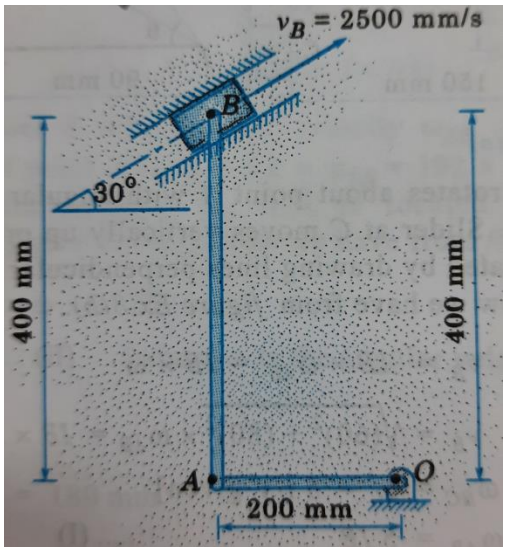
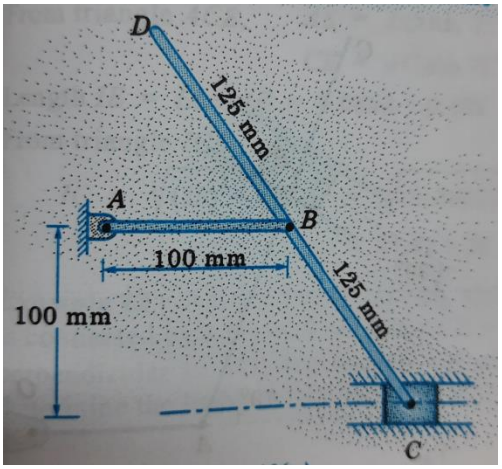


Fig. Ex.6(a)

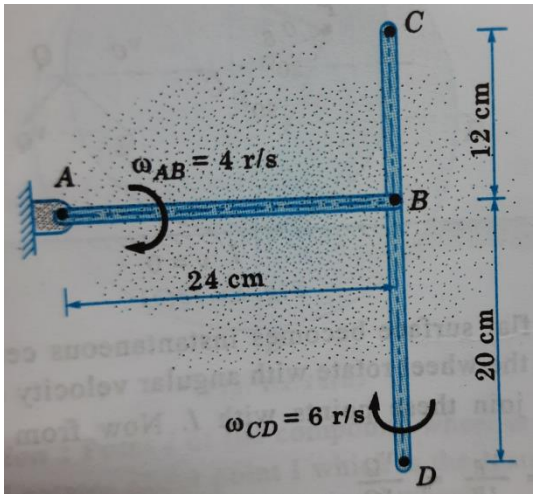
4. For the link and slider mechanism shown in fig. locate the instantaneous centre of rotation of link AB. Find also the angular velocity of link OA. Take velocity of slider at B = 2500 mm/s.



5. At the position shown in fig. the crank AB has an angular velocity of 3 rad/s clockwise. Find the velocity of the slider C and point D at this instant.



6. A bar AB is 24 cm long and is hinged to a wall at A. Another bar CD 32 cm long is connected by a pin at B such that CB = 12 cm and BD = 20 cm. At the instant shown (AB is perpendicular to CD) the angular velocities of the bars are ω_{AB} = 4 rad/s and ω_{CD} = 6 rad/s. Determine the linear velocities of point C and D. Note that bar CD is in plane motion.



7. A wheel of 2 m diameter rolls without slipping on a flat surface. The centre of the wheel is moving with a velocity of 4 m/s towards right. Determine the angular velocity of the wheel and velocity of P, Q and R shown on wheel.