Tutorial # 3: Mechanisms

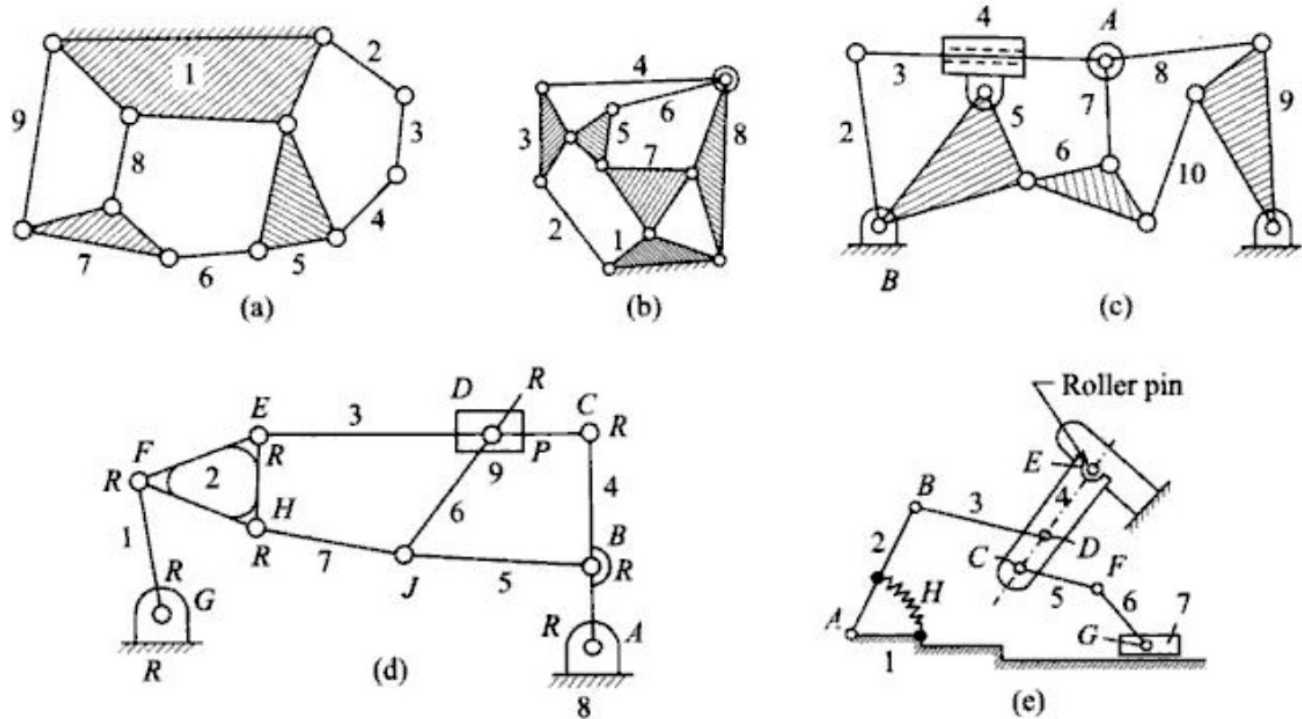Figure 1

Q1. Use Kutzbach criterion to calculate degree of freedom (DOF) for the mechanisms shown in Figure 1.

Q2. Calculate the Grashof condition fof the four bar mechanism having link lengths (in cm) as 4, 9, 14, 18.
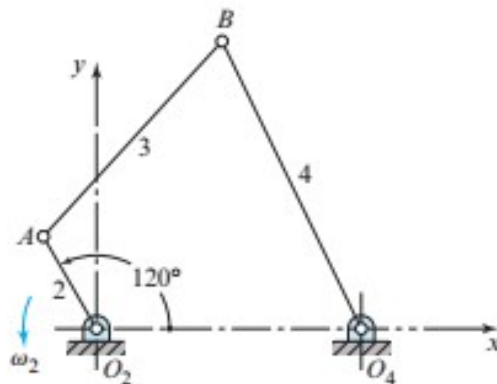

Figure 3

Q3. The four-bar linkage in the posture shown in Figure 3 is driven by crank 2. The link dimensions are: $AO_2 = 4$ cm, $BA = 10$ cm, $O_4O_2 = 10$ cm, and $BO_4 = 12$ cm. Calculate the co-ordinates of all the instant centre of velocities and angular velocities of links 3 and 4.
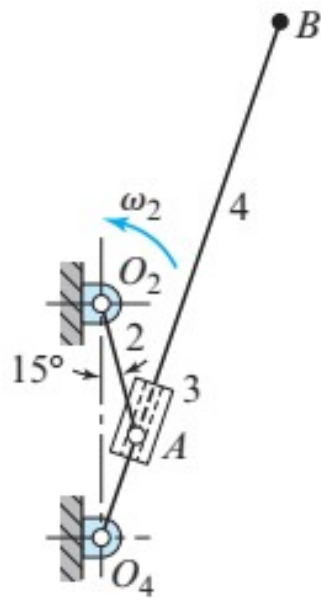
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Figure 4

Q4. For the inverted slider-crank linkage in the posture shown in Figure 4, crank 2 has a constant angular velocity of 60 rev/min counter clockwise (ccw). The link lengths are given as: $O_4O_2 = 12$ cm, $AO_2 = 7$ cm, and $BO_4 = 28$ mm. Find the velocity and acceleration of point B, and the angular velocity and acceleration of link 4.