AE 262 DYNAMICS
2014-2015 SPRING SEMESTER
HOMEWORK #1

Given: 05.03.2015
**Due: 16.03.2015 at <u>13.30</u>**
**Submit to: Ali YILDIRIM (Room 6)**

Q.1) At the instant shown, slider block B is moving to the right with a constant acceleration, and its speed is 15.2 cm/s. Knowing that after slider block A has moved 25.4 cm to the right its velocity is 6 cm/s, determine **(a)** the accelerations of A and B, **(b)** the acceleration of portion D of the cable, **(c)** the velocity and the change in position of slider block B after 4 s.

Q.2) The system shown starts from rest, and the length of the upper cord is adjusted so that A, B, and C are initially at the same level. Each component moves with a constant acceleration. Knowing that when the relative velocity of collar B with respect to block A is 40 mm/s downward, the displacements of A and B are 80 mm downward and 160 mm downward, respectively, determine **(a)** the accelerations of A and B, **(b)** the change in position of block D when the velocity of block C is 300 mm/s upward.
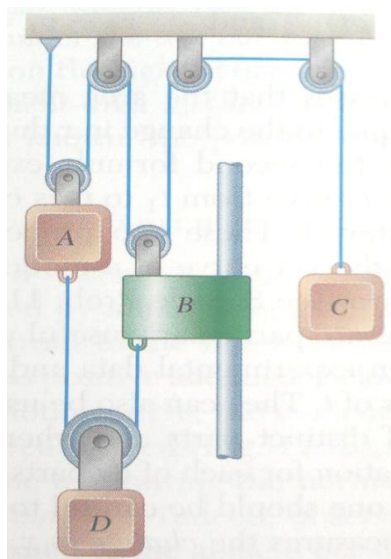
Q.3) A helicopter is flying with a constant horizontal velocity of 144.2 km/h and is directly above point A when a loose part begins to fall. The part lands 6.5 s later at point B on an inclined surface. Determine **(a)** the distance "*d*" between points A and B, **(b)** the initial height "*h*".
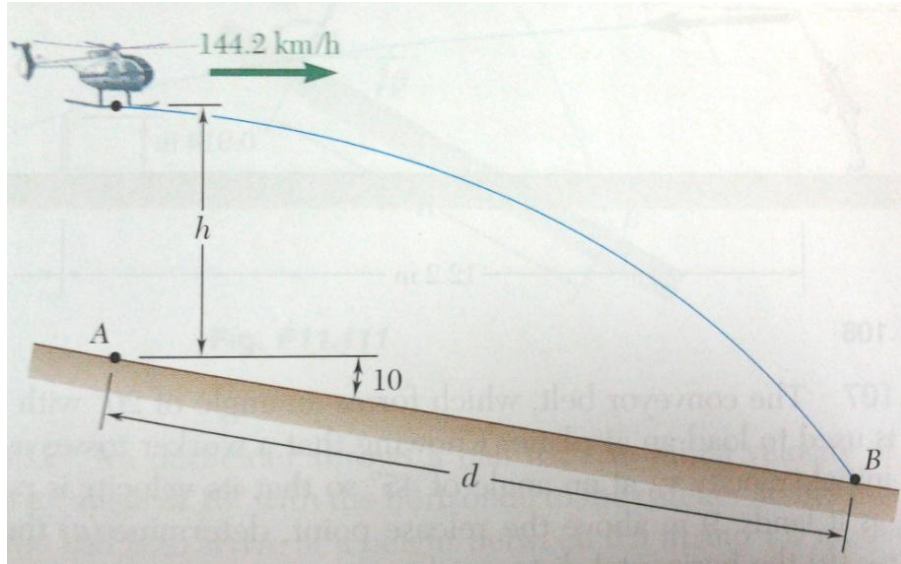
Q.4) The oscillations of rod OA about O is defined by the relation $\theta = \left(\frac{4}{\pi}\right)(\sin \pi t)$, where θ and t are expressed in radians and seconds, respectively. Collar B slides along the rod so that its distance from O is $r = 10/(t + 6)$, where r and t are expressed in mm and seconds, respectively. When $t = 1\ s$, determine **(a)** the velocity of the collar, **(b)** the total acceleration of the collar, **(c)** the acceleration of the collar relative to the rod.