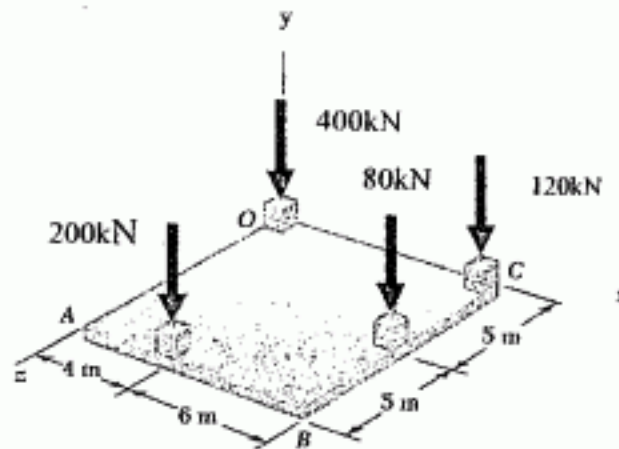


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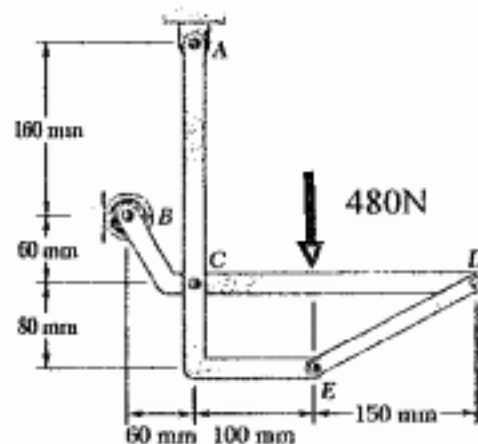
九十三學年度 動力機械 系(所) 丙/丁 組碩士班入學考試

科目 應用力學 1702 科號 1802 共 3 頁第 1 頁 \*請在試卷【答案卷】內作答

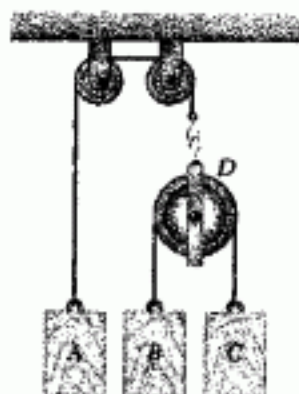
1. A square foundation mat supports the four columns shown. Determine the magnitude and point of application of the resultant of the four loads. (15 %)



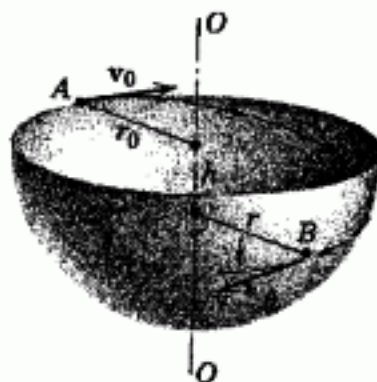
2. In the frame shown, member *ACE* and *BCD* are connected by a pin at *C* and by the link *DE*. For the loading shown, determine the force in link *DE* and the force exerted at *C* on member *BCD*. (15 %)



3. Three blocks  $A$ ,  $B$  and  $C$  are connected as shown in figure, knowing that  $m_A = 10 \text{ kg}$ ,  $m_B = 6 \text{ kg}$  and  $m_C = 4 \text{ kg}$ . If the blocks are released from rest, determine the accelerations of each block and the tensions in each cable. Neglect the masses and axle friction of the pulleys. (15%)



4. A small mass particle is given initial velocity  $v_0$  tangent to the horizontal rim of a smooth hemispherical bowl at a radius  $r_0$  from the vertical centerline, as shown at point  $A$ . As the particle slides past point  $B$ , a distance  $h$  below  $A$  and a distance  $r$  from the vertical centerline, its velocity makes an angle  $\theta$  with the horizontal tangent to the bowl through  $B$ . Given  $v_0 = 1 \text{ m/s}$ ,  $r_0 = 10 \text{ cm}$  and  $r = 8 \text{ cm}$ , determine  $v$  and  $\theta$  at  $B$ . (20%)

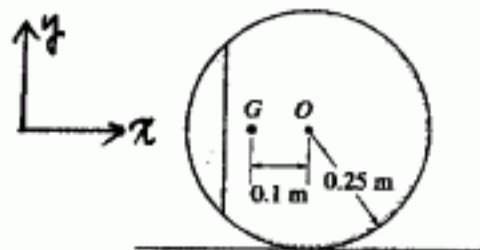


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5. The 30 kg wheel shown in Figure has a radius 0.25 m, a mass center at  $G$  and a radius of gyration  $k_G = 0.15$  m. If the wheel is originally at rest and released from the position shown, determine (1) its angular acceleration, (2) the acceleration of the mass center. Assuming no slipping occurs. (20%)



6. The arm  $AB$  of length 5 m is used to provide an elevated platform for construction workers. In the position shown, arm  $AB$  is being raised at the constant rate  $d\theta/dt = 0.25$  rad/s; simultaneously the unit is being rotated about the  $Y$ -axis at the constant rate  $\omega_1 = 0.15$  rad/s. Knowing that  $\theta = 20^\circ$ , determine the velocity and acceleration of point  $B$ . (15%)

