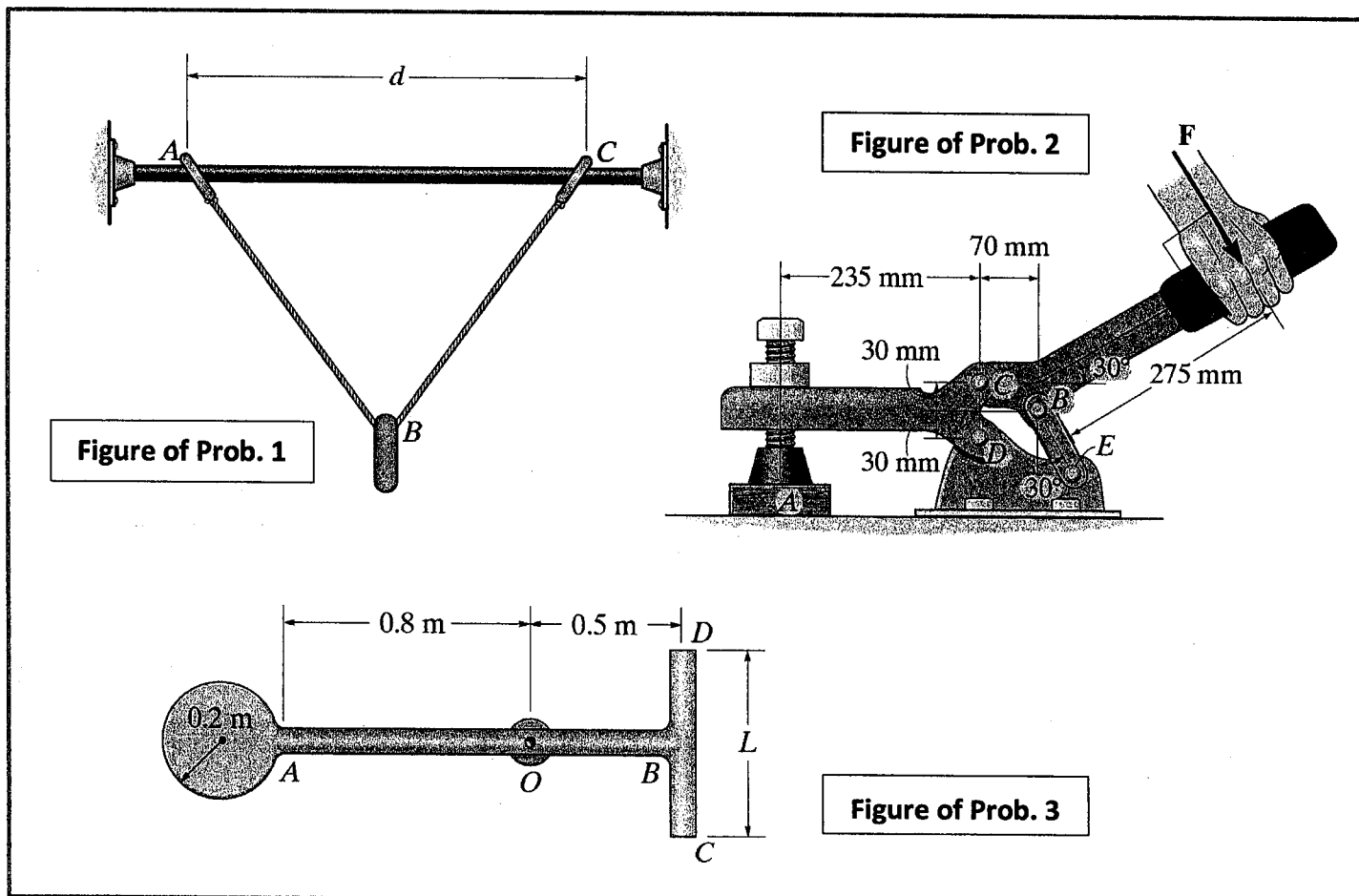


※ 注意：請於試卷內之「非選擇題作答區」作答，並應註明作答之題號。

Note:

1. The solutions may not necessarily appear in order. Mark, however, the number of problems for your solutions clearly.
2. Examinees are responsible to present the problem numbers and answers clearly, cleanly, and precisely.
3. Examinees are responsible to present detailed derivations and calculations, otherwise will receive zero credit.

1. **15pts** The rings  $A$  and  $C$  each weigh  $W$  and rest on the rod, which has a coefficient of static friction of  $\mu_s$ . If the suspended ring at  $B$  has a weight of  $2W$ , determine the largest distance  $d$  between  $A$  and  $C$  so that no motion occurs. Neglect the weight of the wire. The wire is smooth and has a total length of  $l$ . Write your final answer in the form: ( $d =$  \_\_\_\_\_ ).
2. **20pts** If a force  $F$  is applied to the handle of the toggle clamp, determine the resulting clamping force at  $A$ . Draw the Free Body Diagram (FBD) when solving the problem (8pts). Write your final answer in the form: ( $N_A =$  \_\_\_\_\_ ) (12pts)
3. **15pts** The pendulum consists of a disk having a mass of 6 kg and slender rods  $AB$  and  $DC$  which have a mass of 2 kg/m. Determine the length  $L$  of  $DC$  so that the center of mass is at the bearing  $O$  (5pts). What is the moment of inertia of the assembly about an axis perpendicular to the page and passing through point  $O$  (10pts)? Write your final answer in the form: ( $L, I_o =$  \_\_\_\_\_ , \_\_\_\_\_ ).



(請接背面)

4. **20pts** Block  $B$  starts from rest and moves downward with a constant acceleration. Knowing that after slider block  $A$  has moved 400 mm and its velocity is 4 m/s, determine (a) the accelerations of  $A$  and  $B$ , (b) the velocity and the change in position of  $B$  after 2 s. Write your final answer in the form:  $( a_A, a_B, v_B, \Delta y_B ) = ( \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}}, \underline{\hspace{1cm}} )$ .
5. **20pts** The 5-kg rod  $BC$  is attached by pins to two uniform disks as shown. The mass of the 150-mm-radius disk is 6 kg and that of the 75-mm-radius disk is 1.5 kg. Knowing that the system is released from rest in the position shown, determine the velocity of the rod after disk  $A$  has rotated through  $90^\circ$ . Write your final answer in the form:  $v_{rod} = \underline{\hspace{2cm}}$ .
6. **10pts** Determine the amplitude and maximum velocity of a particle which moves in simple harmonic motion with a maximum acceleration of  $60 \text{ m/s}^2$  and a frequency of 40 Hz. Write your final answer in the form:  $( x_m, v_m ) = ( \underline{\hspace{1cm}}, \underline{\hspace{1cm}} )$ .

