

國立中山大學100學年度碩士班招生考試試題

科目：應用力學【機電系碩士班乙組、丙組】

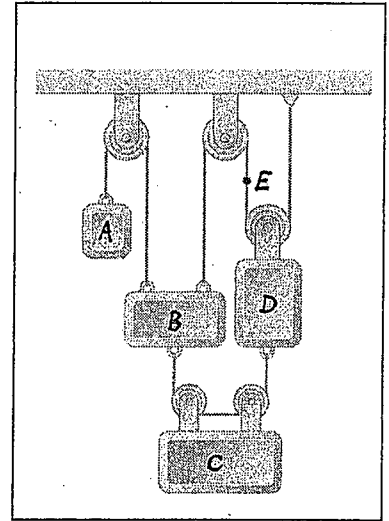
Please choose the correct answers for problem 1 to problem 3

Please be noted that the correct answers for each problem may be more than one

1. Block C starts from rest and moves downward with a constant velocity.

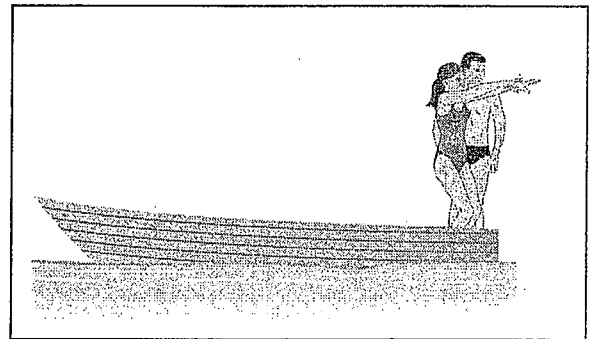
Let V_A , V_B , V_C and V_D be the velocities of blocks A, B, C and D, respectively. Let downward be the positive direction. Then which of the following statements are correct? (10%)

- (A) $V_A = V_B$.
 (B) $V_A = 2V_D$.
 (C) $V_A + 4V_C = 0$.
 (D) $V_B + V_D = 2V_C$
 (E) Let V_E be the velocity of portion E of the cable, then $V_E = V_A$.
 (F) None of the previous statements is correct.



2. A 65.3 kg man and a 43.5 kg woman stand side by side at the same end of a 108.8 kg boat, ready to dive, each with a 4.87 m/s velocity relative to the boat. Neglecting the water resistance. Then which of the following statements are correct? (20%)

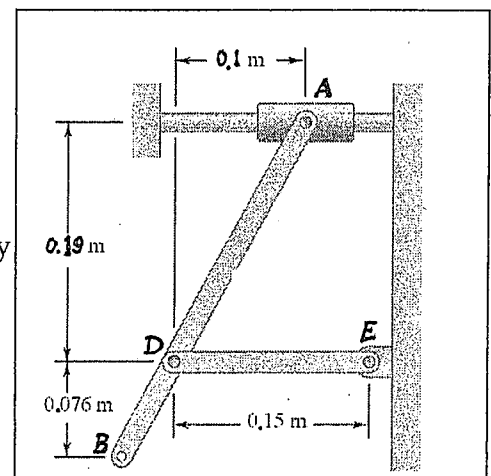
- (A) If the man dives first, the speed of the boat after the man has dived is between 1.4 m/s to 1.5 m/s.
 (B) If the man dives first, the speed of the boat after they have both dived is between 3.9 m/s to 4.1 m/s.
 (C) If the woman dives first, the speed of the boat after the woman has dived is less than 1.5 m/s.
 (D) If the woman dives first, the speed of the boat after they have both dived is greater than 4.1 m/s.
 (E) If they dive simultaneously, the speed of the boat after they have both dived is less than 4.1 m/s
 (F) None of the previous statements is correct



3. Knowing that at the instant shown the velocity of collar A is zero and its acceleration is 0.24 m/s^2 to the left.

Which of the following statements are correct? (20%)

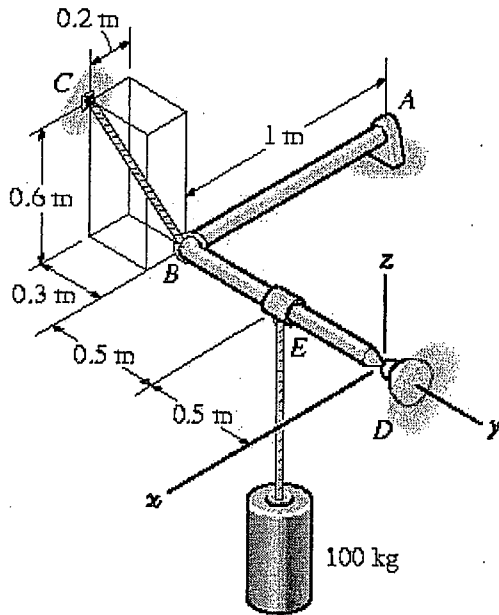
- (A) The angular velocity of the bar AB is zero at this instant.
 (B) The angular velocity of the bar DE is zero at this instant.
 (C) At this instant, the velocity of point D is zero, but the velocity of point B is not zero.
 (D) At this instant, the angular accelerations of bar AB is in the counter-clockwise direction, but the angular accelerations of bar DE is in the clockwise directions.
 (E) At this instant, the acceleration of point B is zero, but the acceleration of point D is not zero..
 (F) None of the previous statements is correct.



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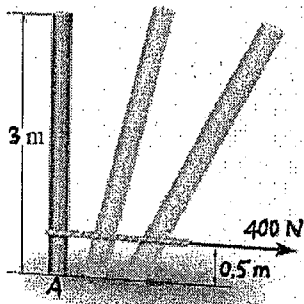
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- 4 The bent rod is supported at A by a journal bearing, at D by a ball and socket joint, and at B by means of cable BC. Using only one equilibrium equation, obtain a direct solution for the tension in cable BC. The bearing at A is capable of exerting force components only in the z and y directions since it is properly aligned. (20%)



(a)

5. The uniform slender pole has a mass of 100kg. If the coefficients of static and kinetic friction between the end of the pole and the surface are $\mu_s = 0.3$ and $\mu_k = 0.25$ respectively, determine the pole's angular acceleration at the instant the 400N horizontal force is applied. The pole is originally at rest. (20%)



6. Indicate all zero-force members of the Baltimore truss. (10%)

