

國立中山大學 113 學年度 碩士班暨碩士在職專班招生考試試題

科目名稱：應用力學(含靜力學及動力學)【機電系碩士班乙組】

—作答注意事項—

考試時間：100 分鐘

- 考試開始鈴響前不得翻閱試題，並不得書寫、劃記、作答。請先檢查答案卷(卡)之應考證號碼、桌角號碼、應試科目是否正確，如有不同立即請監試人員處理。
- 答案卷限用藍、黑色筆(含鉛筆)書寫、繪圖或標示，可攜帶橡皮擦、無色透明無文字墊板、尺規、修正液(帶)、手錶(未附計算器者)。每人每節限使用一份答案卷，請斟酌作答。
- 答案卡請以 2B 鉛筆劃記，不可使用修正液(帶)塗改，未使用 2B 鉛筆、劃記太輕或污損致光學閱讀機無法辨識答案者，後果由考生自負。
- 答案卷(卡)應保持清潔完整，不得折疊、破壞或塗改應考證號碼及條碼，亦不得書寫考生姓名、應考證號碼或與答案無關之任何文字或符號。
- 可否使用計算機請依試題資訊內標註為準，如「可以」使用，廠牌、功能不拘，唯不得攜帶書籍、紙張(應考證不得做計算紙書寫)、具有通訊、記憶、傳輸或收發等功能之相關電子產品或其他有礙試場安寧、考試公平之各類器材入場。
- 試題及答案卷(卡)請務必繳回，未繳回者該科成績以零分計算。
- 試題採雙面列印，考生應注意試題頁數確實作答。
- 違規者依本校招生考試試場規則及違規處理辦法處理。

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題號：438008

※本科目依簡章規定「可以」使用計算機(廠牌、功能不拘)(問答申論題)

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All figures are for illustrative purposes only and not to scale.

1. (20%) The object shown in **Figure 1** contains three subblocks; **determine the coordinates of the object's centroid**. The object is homogenous. The unit of length is millimeter, round to the second decimal place.

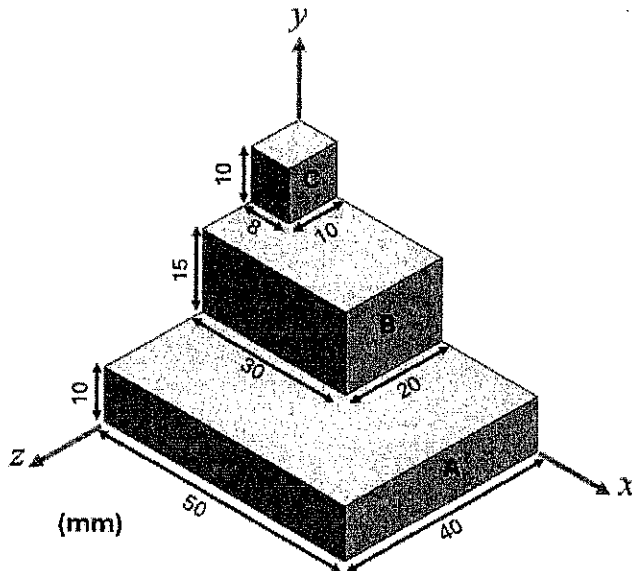


Figure 1

2. (20%) A bracket in **Figure 2** is attached with three cables. The cables exert three forces on the bracket. F_1 is on the xy plane, F_2 is on the xz plane, and F_3 is toward the negative z direction. Neglect the thickness of the bracket, **replace the forces with an equivalent force-couple system at point D** . Use newton (N) and meter (m) for the units of the answers. Use i, j, k for the unit vectors with respect to x, y, z coordinates. (10% for the force and 10% for the couple)

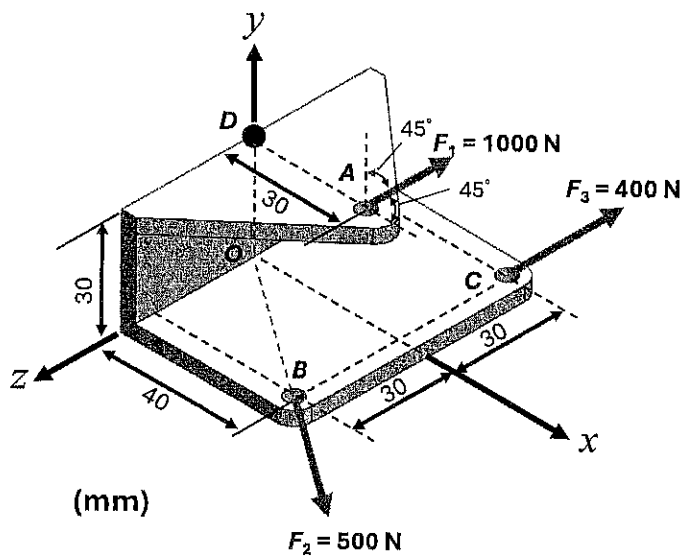


Figure 2

(There are questions on the next page.)

試題請隨卷繳回，請留意背面是否有題

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3. (20%) As shown in Figure 3, in the beginning, block *A* is sliding to the right with a speed of 13 m/s, and ball *B* is resting at the edge of the step. The distance between block *A* and ball *B* is 10 m. After an *elastic* collision, ball *B* falls to point *B'* as shown in the figure. Block *A* is 5 kg, and ball *B* is 10 kg. Neglect the volumes of the block and the ball, determine the distance that block *A* slides after collision. ($g = 9.8 \text{ m/s}^2$)

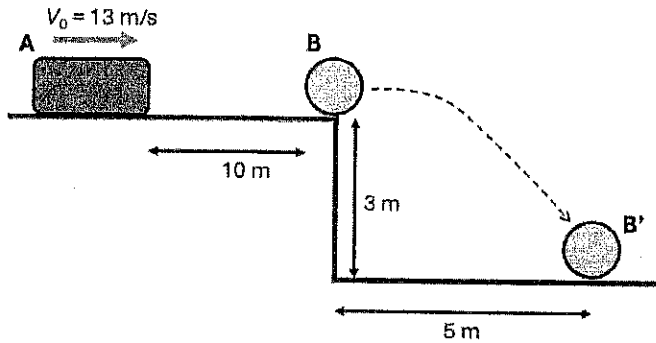


Figure 3

4. (20%) An 18-kg slender rod is attached to a spring with an unstretched length of 5 m. In the beginning, when $\theta = 30^\circ$, the rod has an angular velocity of 3 rad/s CW. Determine the angular velocity of the rod when $\theta = 90^\circ$. ($g = 9.8 \text{ m/s}^2$)

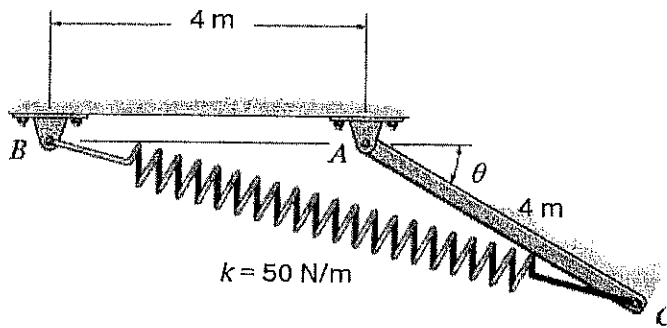


Figure 4

5. (20%) The plate gears *A* & *B* in Figure 5 rotate with the angular velocities as shown. Determine:
 (1) (10%) The angular velocity of gear *C* about the shaft *DE*.
 (2) (10%) The angular velocity of *DE* about the *y*-axis.

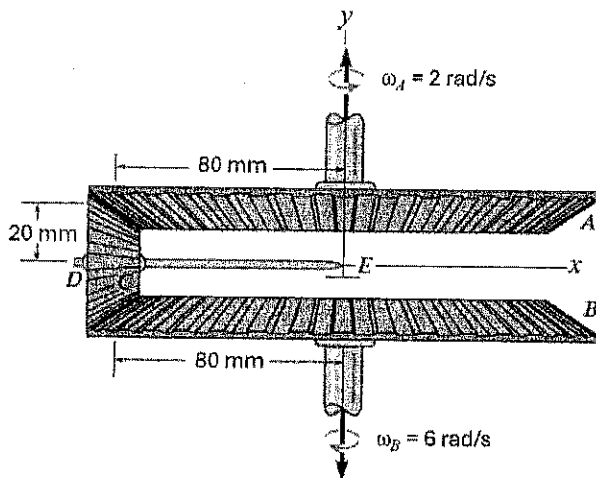


Figure 5