國立中山大學114學年度
碩士班考試入學招生考試試題

科目名稱：材料力學【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，請衡酌作答。
- 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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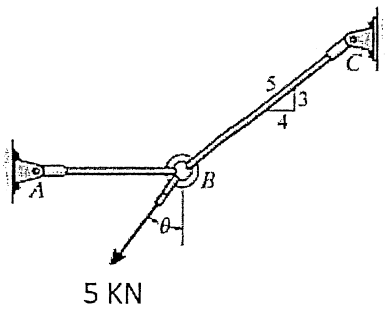
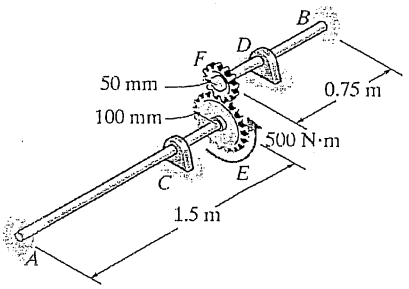
科目名稱：材料力學【機電系碩士班乙組】　　題號：438002

※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）　

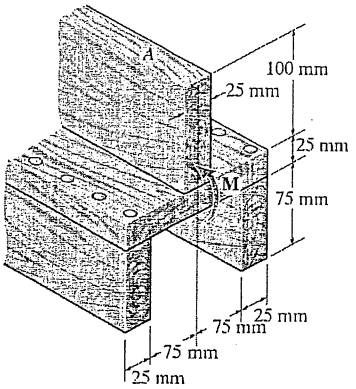
1. The Rods AB and BC have diameters of 6 mm and 8 mm, respectively. If the 5 kN force is applied to the ring at B, determine the angle θ so that the average normal stress in each rod is equivalent. What is this stress? **(10%)**



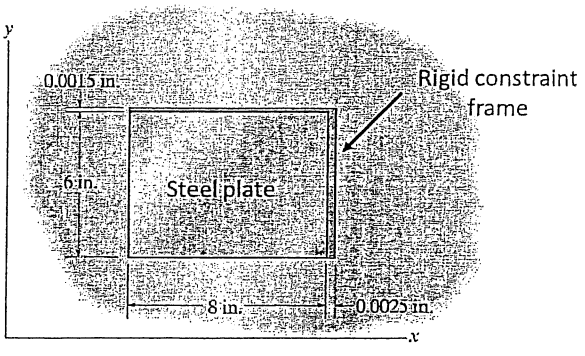
2. The two shafts are made of A-36 steel. Each has a diameter of 25 mm and they are connected using the gears fixed to their ends. Their other ends are attached to fixed supports at A and B. They are also supported by journal bearings at C and D, which allow free rotation of the shafts along their axes. If a torque of 500 N • m is applied to the gear at E, determine the rotation of this gear. (Shear modulus=75 GPa) **(15%)**



3. If the beam is subjected to an internal moment of M = 8 kN • m, determine the maximum tensile and compressive stress in the beam. **(15%)**



4. Initially, gaps between the A-36 steel plate (E=29x10^3 ksi; $\alpha = 6.6\text{x}10^{-6}/^oF$; $\nu = 0.32$) and the rigid constraint frame are as shown (Gap in x direction is 0.0025 inches, gap in y direction is 0.0015 inches). Determine the normal stresses σ_x and σ_y in the plate if the temperature is increased by $\Delta T = 150^oF$. **(15%)**



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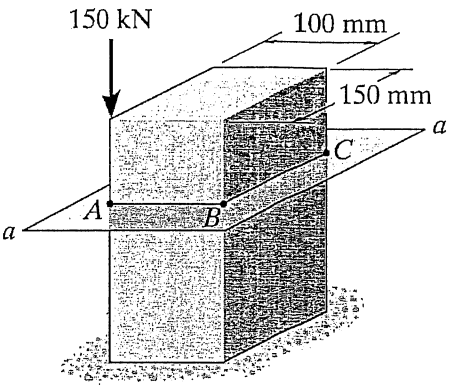
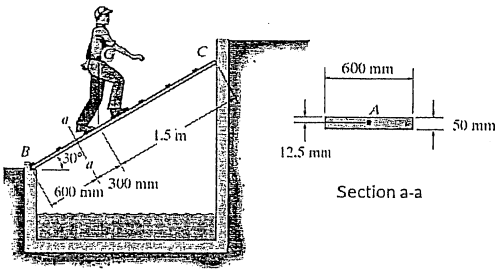
5. The block is subjected to the eccentric load shown. Determine the normal stress developed at points A and B. Neglect the weight of the block. **(15%)**



6. If the 60-kg man stands in the position shown, determine the state of stress at point A on the cross section of the plank at section a–a. The center of gravity of the man is at G. Assume that the contact point at C is smooth. **(15%)**



7. The beam has a rectangular cross section and is subjected to the loadings shown. Determine the principal stresses at point A and point B, which are located just to the left of the 25-kN load. Show the results on elements located at these points. **(15%)**