

國立成功大學

111學年度碩士班招生考試試題

編 號： 67

系 所： 機械工程學系

科 目： 靜力學及專業英文

日 期： 0219

節 次： 第 1 節

備 註： 可使用計算機

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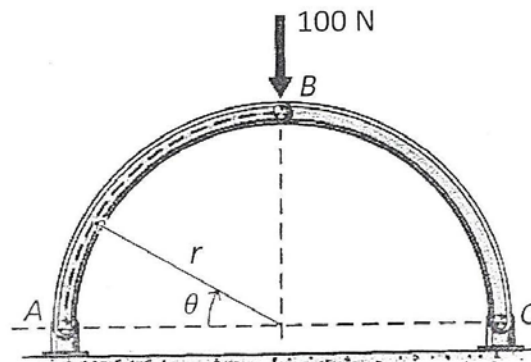
第 1 頁，共 2 頁

※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

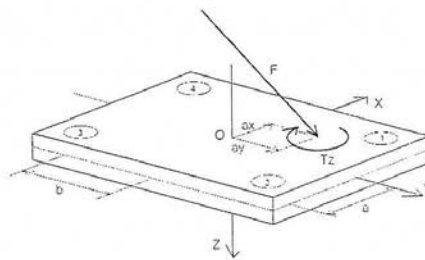
1. (25%) 請將以下中文翻譯成英文。

- (1) 單螺紋與雙螺紋之導程分別等於 1 和 2 倍的節距。
- (2) 預測韌性材料破壞的理論包含：最大正向應力理論、最大剪應力理論與畸變能理論。
- (3) 當機械原件承受反覆或變動負載，所受應力在降伏點之下即可能破壞，此種損壞為疲勞破壞。
- (4) 機械設計所需的基礎課程包括：靜力學、動力學、材料力學、流體力學以及機構學。

2. (25%) An arch support shown in following figure consists of two quarter circle members. Determine the axial force P , shear force V , and bending moment M in member AB as a function of the angle θ and the radius r .



3. (25%) A force plate as shown is a device to measure the center of pressure (CP), which has four tri-axial load cells (1, 2, 3, and 4) at 4 corners. The point of application of the ground reaction force on the plate is the center of pressure. All the forces acting on the plate can be summed to yield a single ground reaction force vector ($F = F_x i + F_y j + F_z k$) and a free torque vector ($T_z = T_z k$). The coordinate is as shown and the origin O is at the center of plate. The readings of four load cells are $F_1 = F_{x1} i + F_{y1} j + F_{z1} k$, $F_2 = F_{x2} i + F_{y2} j + F_{z2} k$, $F_3 = F_{x3} i + F_{y3} j + F_{z3} k$, and $F_4 = F_{x4} i + F_{y4} j + F_{z4} k$. (a) Write the equilibrium equations at the origin O. (b) Compute the location of the center of pressure (a_x, a_y) and the free torque T_z . (c) If the load cell 1 cannot read its signal, can we still determine the location of CP. If yes, give your answer.



4. (25%) A countershaft has a helical gear (B), a bevel gear (D), and two supporting bearings (A and C) as shown. Loads acting on the bevel gear are known. Forces acting on helical gear are also shown in the figure and F_y is unknown. Shaft dimensions are known in mm. Only the bearing A takes thrust (axial force, x direction). (a) Draw the free body diagram for the shaft. (b) Compute F_y at helical gear B and the reaction forces at bearing A and C. (c) Draw shear load and bending moment diagrams for the shaft in the xy and xz planes. Also, draw diagrams shown the axial force and torque along the shaft.

