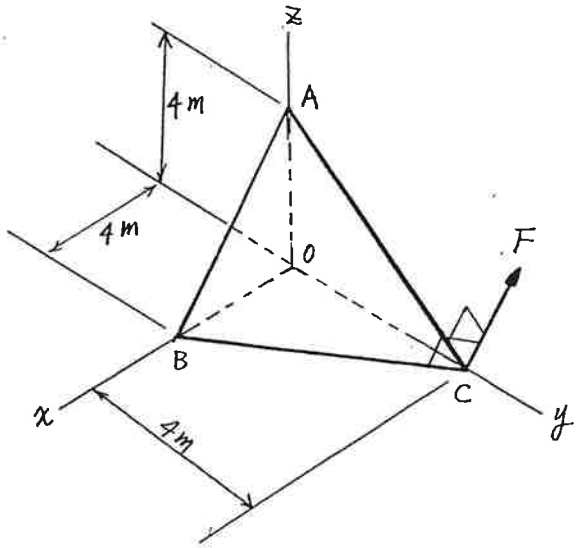
臺灣綜合大學系統112學年度學士班轉學生聯合招生考試試題

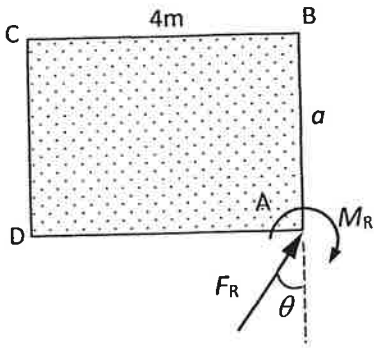
科目名稱	應用力學	類組代碼	D37
		科目碼	D3791

※本項考試依簡章規定所有考科均「不可」使用計算機。　　本科試題共計 2 頁

1. Force **F** of a magnitude 400 N acts perpendicular to the inclined plane ABC. (1) Express **F** as a Cartesian vector. (2) Use vector cross-product formula (向量外積公式) to compute the moment $\mathbf{M}_O$ produced by **F** about the origin? Express $\mathbf{M}_O$ in a vector form. (3) What is the shortest distance between the origin and the line of action of **F**? (30% =15+10+5%)



2. A force system with a resultant F_R and a moment M_R is applied at corner A of a rectangular plate. If we know that the force system can be replaced by a single resultant force without a resultant moment when acting at corners B or D. Determine the magnitude F_R and length a of the rectangular plate, when $\cos\theta = 0.6$ and M_R=12 kN-m. (20%)



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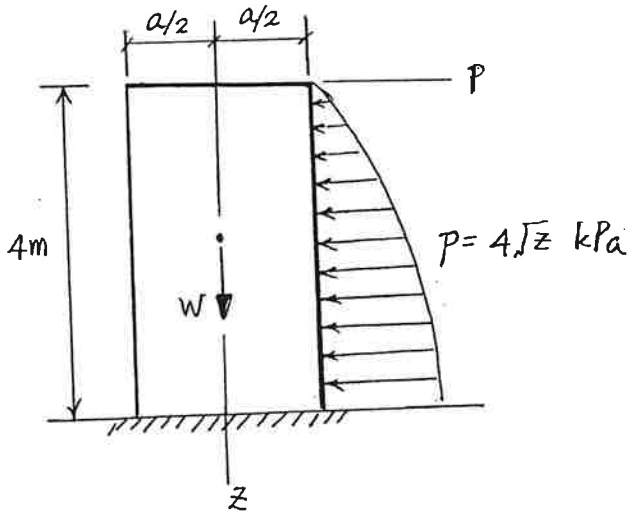
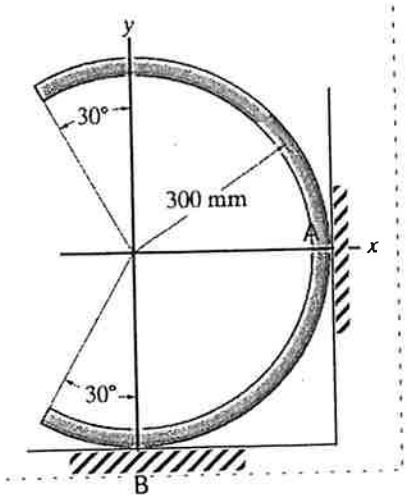
3. As shown below, a rectangular rigid block of a weight W=2000 kN is subjected to a horizontal distributed load $p(z) = 4\sqrt{z}$ kPa. The block has a depth of 5 m. What is minimum width a for the block to prevent the block from overturning? Assume the friction coefficient between the block and the ground is $\mu = 0.6$. Draw the free body diagram for the block. (25%)



4. A circular arc made of homogeneous material is shown below. The arc is rest on the ground and against a wall. (1) If the weight of per unit length of the arc is 10N/mm, locate the center of weight $(\bar{x}, \bar{y})$ for the arc by integration. (2) Determine the minimum friction coefficient μ between the arc and the ground, so the arc will not slip. Neglect the friction of the wall. Draw the free body diagram for the arc. Hint: sin $\theta = 0.886$, cos $\theta = 0.5$, when $\theta = 120°$. (25%= 15+10%)