臺灣綜合大學系統114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. As shown in the figure, the L-shaped rigid frame *ABC* lies in the x–z plane. Supports that *A* and *C* are ball-and-socket joints, and *BD* is connected by a cable. Joint *D* is located in the y–z plane. If the tension in the cable has magnitude *T*, use the dot product method to compute the components of the cable tension applied at joint *B* that are parallel to and perpendicular to the *AC* axis. Express both components in Cartesian vector form. No credits will be given if the dot product method is not used. (20%)

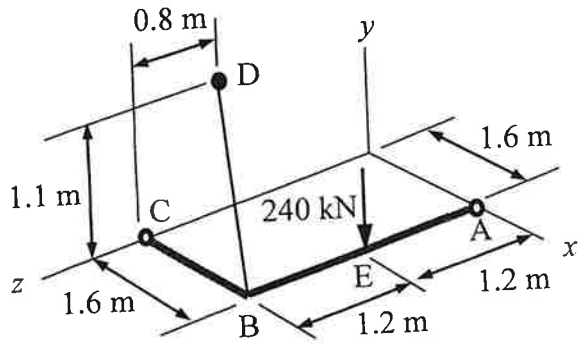

Fig. 1

2. As shown in Problem 1, the rigid frame is subjected to a 240-kN concentrated load at point E. Using the moment equilibrium equation about the *AC* axis exclusively, calculate the tension *T* in the cable *BD*. Calculate the perpendicular distance between the cable *BD* and the *AC* axis. (25%)

3. Replace the loading on the frame with a single resultant force. The distributed load applied to member *AB* is defined by a function $w(x) = 100(-x^2 - x + 2)$ (N/m). Specify where the line of action of the resultant intersects a horizontal line along member *BC*, measured from point *B*. Sketch the single resultant on the frame. (30%)

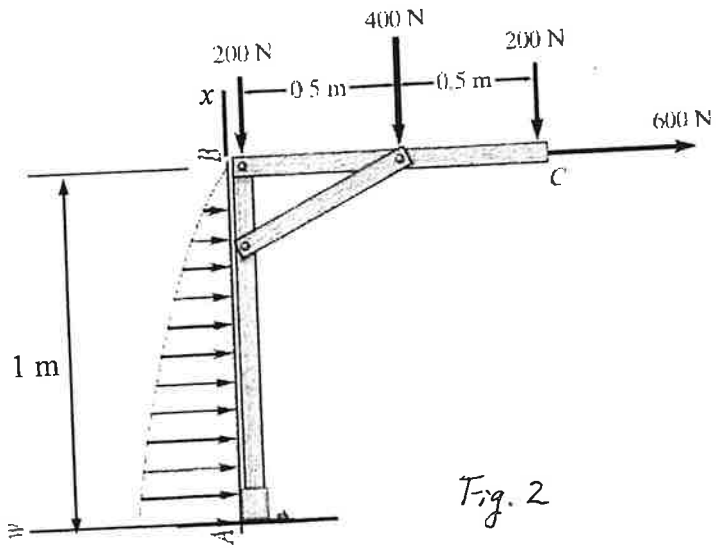

Fig. 2

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4. In the following mechanism, support A is a roller, support B is a hinge, and all other joints are pin connections. Use the method of virtual work to find the relationship between the forces P and Q, when $\theta = 45°$. (25%)

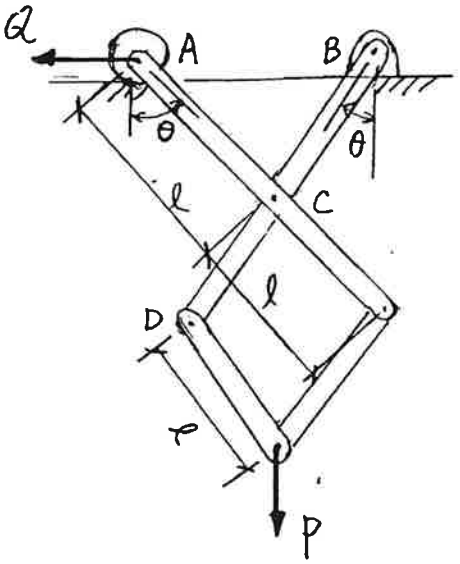

Fig. 3