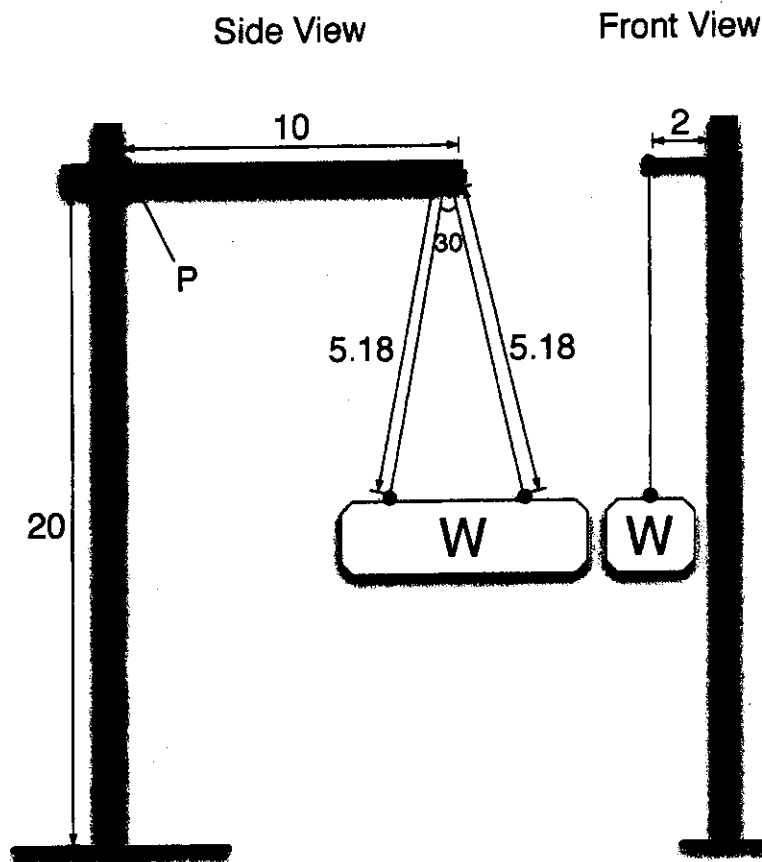系所組別： 機械工程學系丙組

考試科目： 靜力學　　　　　　　　　　　　　　　　　　考試日期：0307，節次：1

※ 考生請注意：本試題 ☑可　□不可　使用計算機

1. Tower cranes is commonly used in construction sites to lift heavy loads. The crane as shown in the figures (with the angle in degree) is a special crane with the load W lifted eccentrically (2 meters off the member A). Please identify the maximal load W this crane can carry without failure at point P. All dimensions are in meters. Both members A and B have circular cross section with areas $=1/\sqrt{\pi}$. The crane has the following material properties : tensile yield strength 207 MPa, ultimate tensile strength 379 MPa, modulus of elasticity 207GPa, modulus of rigidity 80 GPa, Poisson ratio 0.28, mass density 7.8 g/cm³ . (25%)

2. The structure as shown consists of a beam (length=10 in, area=20 in², and moment of inertia 60 in⁴) and two truss members (length =10 in, area=2 in²). A 1000 lb load is applied directly downward at the end of the beam as shown.

(1) Please draw the free body diagram of the structure (5%)

(2) Calculate the reaction forces of the truss members (10%)
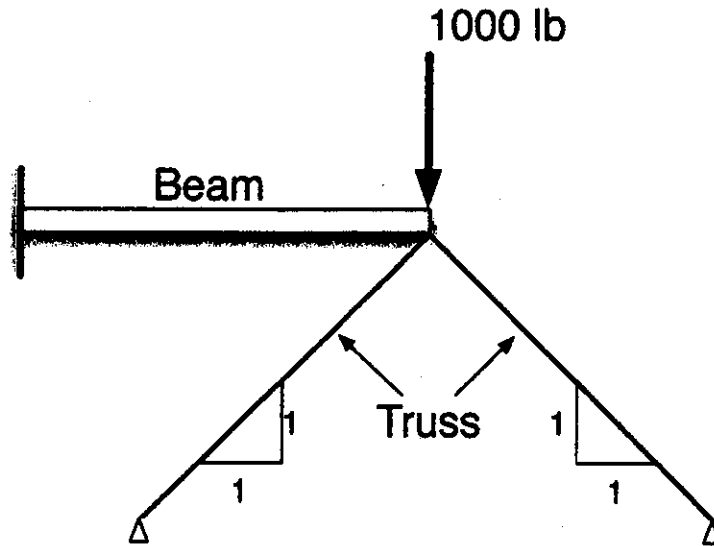
(3) Calculate the reaction force of the beam (10%)

※ 考生請注意：本試題 □可 □不可 使用計算機

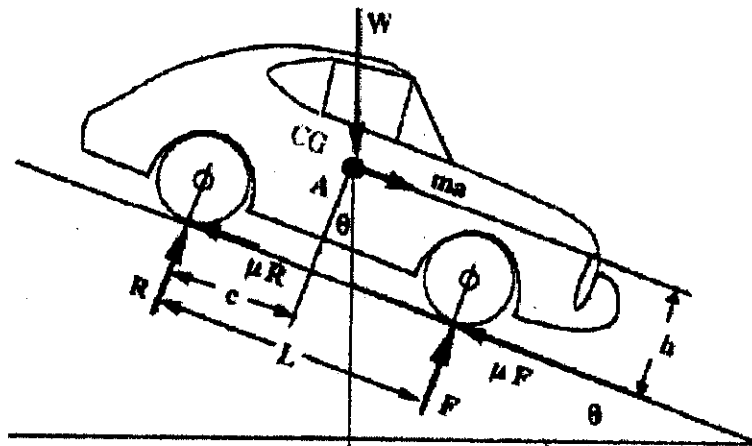**1000 lb**

Beam

Truss

3. A car is downhill at a grade of 10:1, as show below. If W = 4000 lb, L = 120 in., h = 26 in., c = 70 in., and μ = 0.7. Assuming that the deceleration force (A = ma) of the car and the friction forces are constants. Find the reaction force F at the front wheel. (25%)

4. 專業英文：翻譯下列英文為中文、中文為英文 (25%)

(1) V-belts are used with electronic motors to drive blowers, compressors, appliances, machine tools, farm and Industrial machinery, and so on.　One or more V-belts are used to drive the accessories on automotive and most other internal combustion engines. (13%)

(2) 由觀測資料告訴我們，自 20 世紀以來台灣的平均溫度在百年內大約上升了攝氏 1.4 度，是同期全球平均增溫速率的 2 倍。(12%)