1. 試說明挫屈(buckling)的現象?(5%)

2. 圖 1 為高度相同的兩根樑相疊，圖 2 為高度兩倍的一根樑，當受到相同外力時，請問何者變形較小?為什麼?(5%)

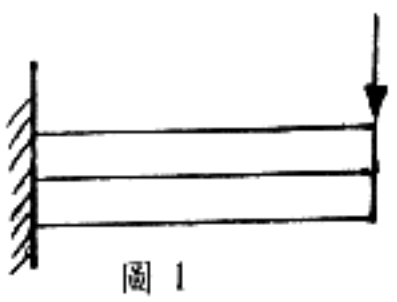

圖 1

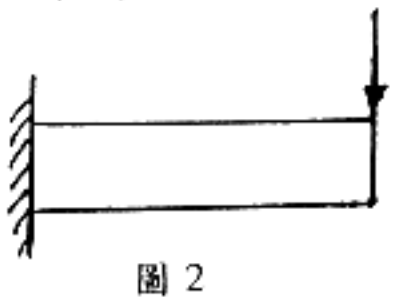

圖 2

3. Draw the moment and shear diagram for the beam in the figure 3.(10%) Determine the displacement of point B on the beam by integration.(10%)

4. What is the Castigliano's theorem?(5%) Use Castigliano's theorem to determine the displacement of point B on the beam(figure 3).(15%)

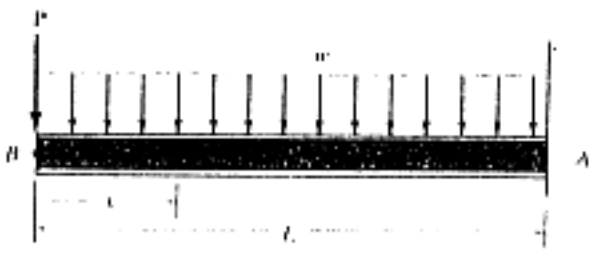

Figure 3

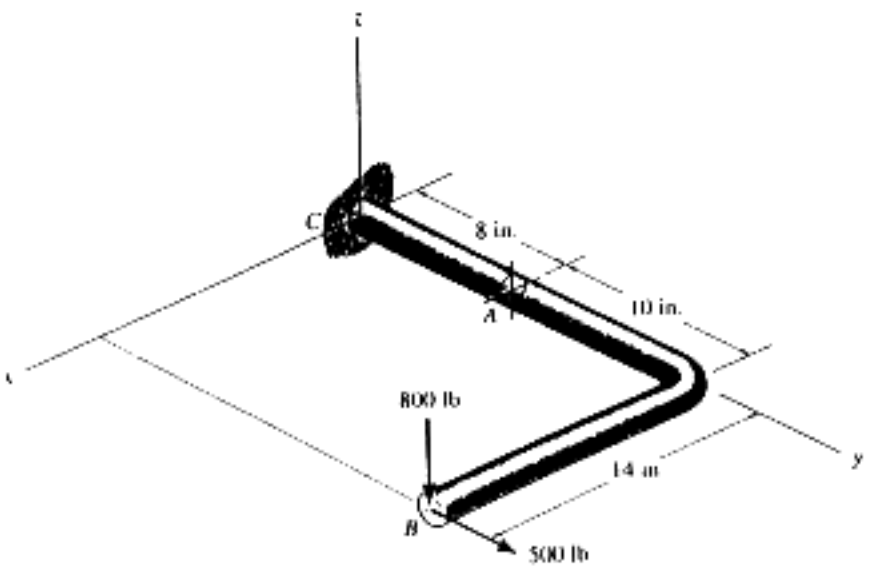

Figure 4

5. The solid rod in the figure 4 has a radius of 0.75 in. If it is subjected to the loading shown, determine the state of stress at point A.(30%) (Note: Point A is subjected to the combine loading with normal force, shear force, bending moment and torsional moment. 請分門別類討論上述各狀況引起的應力。最後應力狀況之表達，請說清楚σ_x σ_y σ_z τ_{xy} τ_{xz} τ_{yz}分別為多少?)

6. Lifting a weight to a height of 20 m takes 20 s for one crane and 10 s for another. Is there any difference in the amount of work done on the weight by each crane?(10%)

7. 當熱由 Medium 1 經 wall 傳至 Medium 2 時，其 entropy、exergy（availability）如何變化？試完成圖中未完成的部分。(10%)