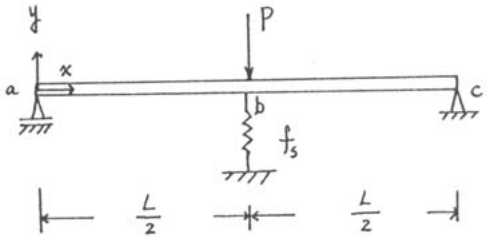
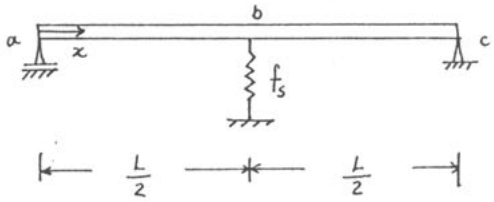
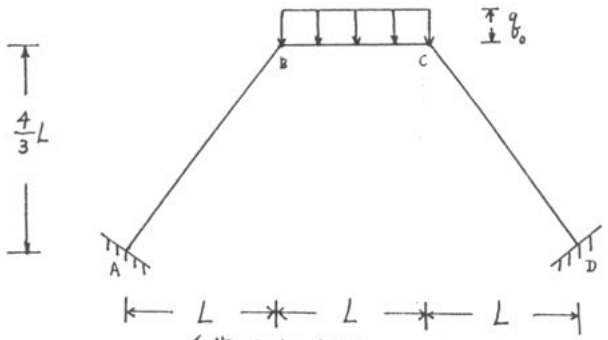
1. For the system as shown, determine the internal spring force by the method of consistent deformations.
   (a) Use the internal spring force (F_s) as redundant. (10%)
   (b) Use the internal moment at point b (i.e., M_b) as redundant. (10%)
   (c) According to your results, Interpret the values of the spring force and the corresponding supports for two special cases, namely $f_s = 0$ and $f_s = \infty$. (5%)
   (d) If the internal moment at point b (i.e., M_b at $x=L/2$) is known, draw the moment diagrams for the system. (5%)
   f_s is the flexibility of the spring, and the bending rigidity of the beam EI=constant.



2. For the system as shown, draw the influence line for the internal spring force (F_s). Plot numerical values every 0.1L. Assume the flexibility of the spring $f_s = \frac{L^3}{48EI}$, and the bending rigidity of the beam EI=constant. (25%)



3. Determine the moments at each joint of the frame as shown.
   (a) Use the slope-deflection method. (10%)
   (b) Use the moment distribution method. (10%)
   The symmetric condition has to be used in the above analysis. EI=constant.



(背面仍有題目,請繼續作答)

4. Determine the forces in the members of the pin-connected system as shown using the matrix displacement method, if member *bd* was made ΔL too short before it was fitted into place. The axial rigidity AE=constant. (25%)