

※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

[注意：以下各題請使用指定方法作答，否則不予計分]

1. Consider a beam AB with a vertical load P applied at point B as shown below. Support B is a roller that prevents rotation. Using the conjugate beam method, (1) compute the support reactions at A and B, (2) compute the deflection at support B. Neglect the axial force effect. (25%)

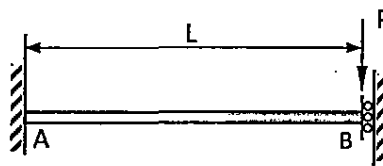


Figure 1

2. A truss structure is shown in Figure 2(a), where support a is a hinge and rest of supports are rollers. If support d has a vertical settlement of 0.01m, compute all the support reactions (indicate the direction), using the following information: (1) when a 1-kN force is applied at support b as shown in Figure 2(b), the deflections at supports b and d are 0.002 m and -0.001 m, respectively. (2) When a 1-kN force is applied at support d as shown in Figure 2(c), the deflection at support d is 0.003m. The directions of deflections and reactions are defined as positive upward. Assume that the structure behaviors linearly. (20%)

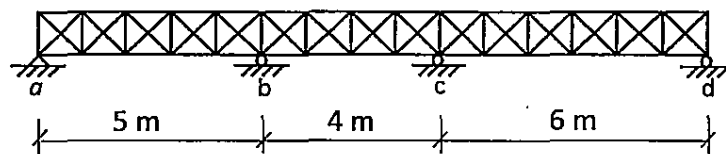


Figure 2(a)

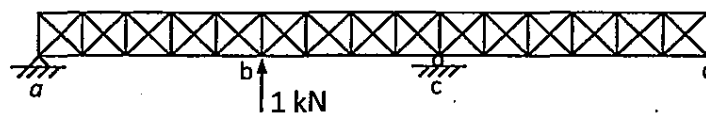


Figure 2(b)

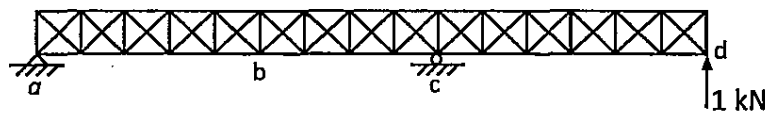


Figure 2(c)

3. As shown below, a structure is composed of a truss ADGB and a column BC. Joint A and B are hinges. Using the method of consistent deformation, compute the reactions (indicate the direction) at supports A and C. Assume that the bending rigidity for the column is $EI = 1 \text{ kN}\cdot\text{m}^2$ and axial rigidity for all truss members is $AE = 1 \text{ kN}$. Neglect the axial deformation of the beam. (25%)

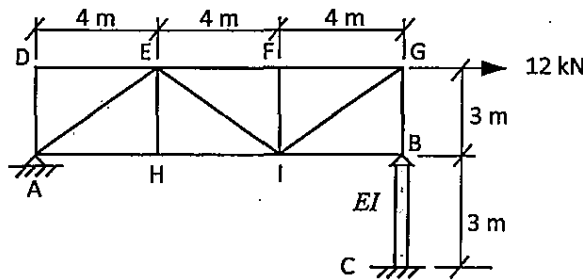


Figure 3

4. Consider a frame shown below. The bending rigidity EI for all members is indicated in the figure. Note that member AB is a rigid member whose EI is infinite. (1) Plot the deflection curve of the whole frame and identify the degrees of freedom. (2) Using the slope-deflection method, compute the end moments of all members. (3) Plot the complete moment diagram for the whole frame, including member AB. Plot the positive moment on the compression side of the member. Neglect the axial deformation of each member. (30%)

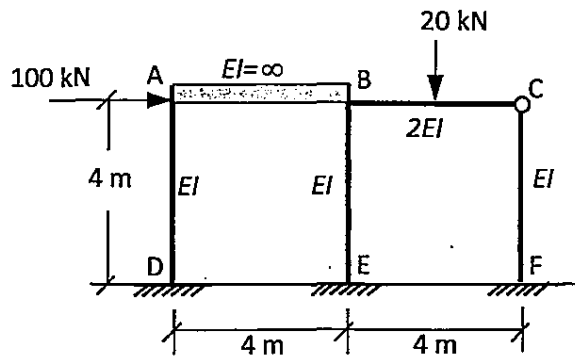


Figure 4