

一、（本题 10 分）分析图 1 所示体系的几何组成。

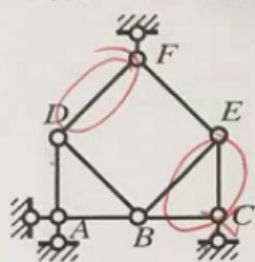


图 1

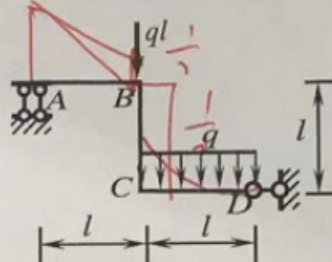


图 2

二、（本题 10 分）作图 2 所示结构的弯矩图。

三、（本题 20 分）作图 3 所示结构的内力图。

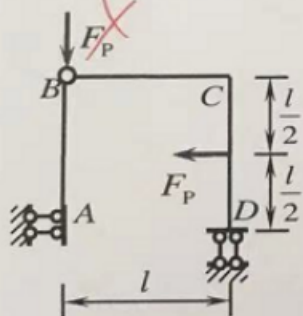


图 3

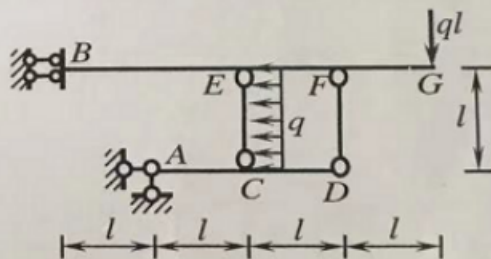


图 4

四、（本题 15 分）作图 4 所示结构的弯矩图，并求杆件 FD 的轴力。

五、（本题 15 分）求图 5 所示结构 C 点竖向位移。

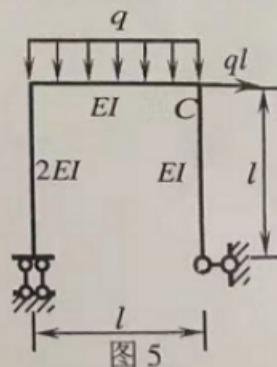


图 5

六、(本题 15 分)用力法作图 6 所示结构的弯矩图。

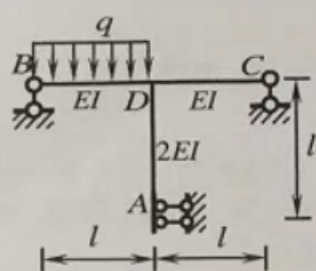


图 6

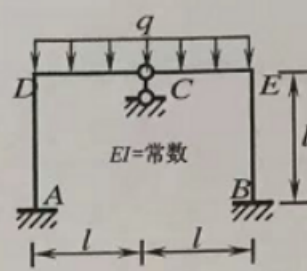


图 7

七、(本题 20 分)选择适当方法作图 7 所示结构的弯矩图。

八、(本题 20 分)用位移法作图 8 所示结构的弯矩图。

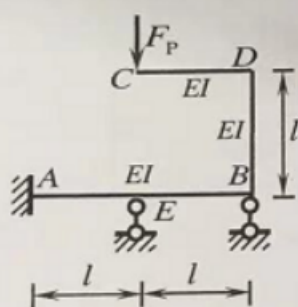


图 8

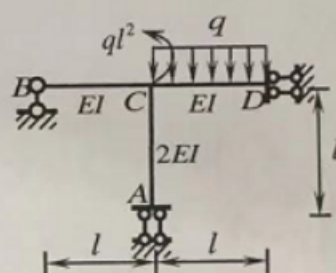


图 9

九、(本题 10 分)用力矩分配法作图 9 所示结构的弯矩图。

十、(本题 15 分)作图 10 所示结构 F_{Cy} 、 M_A 、 M_B 的影响线。

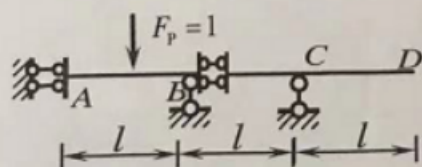


图 10

题 15 分) 用力法作图 6 所示结构的弯矩图。

Diagram 6 shows a frame structure with a horizontal beam BC and a vertical column AB. The beam has a uniformly distributed load q and is supported by a pin at B and a roller at C. The column is fixed at A. The beam has a hinge at D. The column has a hinge at B. The horizontal distance from A to D is l , and from D to C is l . The vertical height of the column is l . The beam has a flexural rigidity EI , and the column has a flexural rigidity $2EI$.

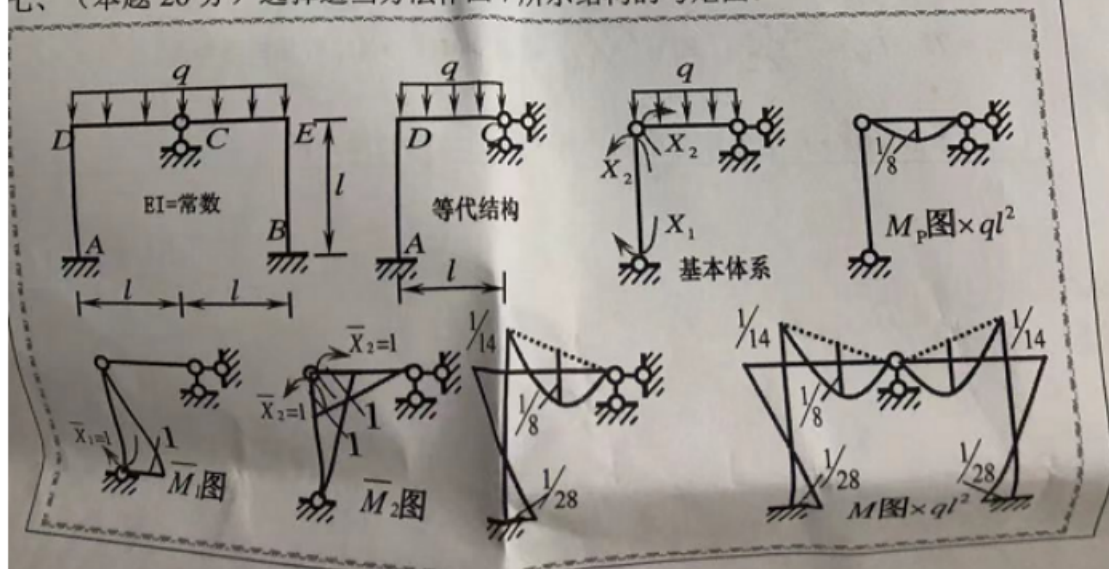
The diagram includes the following components:

- Structure:** A frame with a horizontal beam BC and a vertical column AB. The beam has a uniformly distributed load q and is supported by a pin at B and a roller at C. The column is fixed at A. The beam has a hinge at D. The column has a hinge at B. The horizontal distance from A to D is l , and from D to C is l . The vertical height of the column is l . The beam has a flexural rigidity EI , and the column has a flexural rigidity $2EI$.
- Basic System:** The structure with the hinge at D removed, replaced by a vertical reaction X_1 at D.
- Unit Load Diagram (\bar{M}_1):** The bending moment diagram for the unit load $X_1 = 1$. It shows a linear distribution on the beam from 0 at D to l at C, and a constant value of l on the column from B to A.
- Bending Moment Diagram (M):** The final bending moment diagram for the structure under the distributed load q . It shows the combined effect of the unit load and the distributed load.

$$\delta_{11} = \sum \int \frac{\overline{M}_1 \overline{M}_1}{EI} ds = \frac{8l^3}{3EI} \quad \Delta_{1P} = \sum \int \frac{\overline{M}_1 M_P}{EI} ds = \frac{17ql^4}{24EI}$$

七、(本题 20 分) 选择适当方法作图 7 所示结构的弯矩图。

七、(本题 20 分) 选择适当方法作图 7 所示结构的弯矩图。

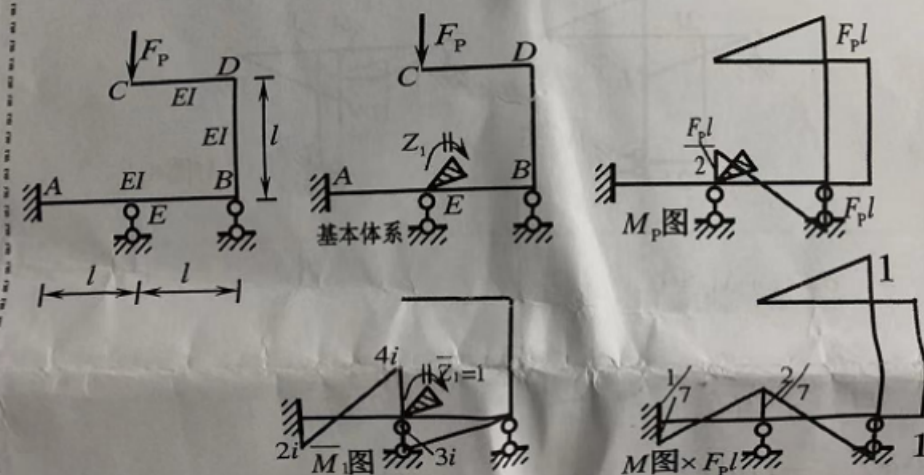


$$\begin{aligned} \delta_{11}X_1 + \delta_{12}X_2 + \Delta_{1P} &= 0 & \delta_{11} &= \sum \int \frac{\bar{M}_1 \bar{M}_1}{EI} ds = \frac{l}{3EI} & \Delta_{1P} &= \sum \int \frac{\bar{M}_1 M_P}{EI} ds = 0 \\ \delta_{21}X_1 + \delta_{22}X_2 + \Delta_{2P} &= 0 & \delta_{22} &= \sum \int \frac{\bar{M}_2 \bar{M}_2}{EI} ds = \frac{2l}{3EI} & \Delta_{2P} &= \sum \int \frac{\bar{M}_2 M_P}{EI} ds = \frac{ql^3}{24EI} \\ \delta_{12} = \delta_{21} &= \sum \int \frac{\bar{M}_1 \bar{M}_2}{EI} ds = \frac{l}{6EI} & X_1 &= ql^2/28 & X_2 &= -ql^2/14 \end{aligned}$$

由 $M = \bar{M}_1 X_1 + \bar{M}_2 X_2 + M_P$ 作弯矩图。

$$\begin{aligned} \frac{l}{3EI} X_1 + \frac{l}{6EI} X_2 &= 0 \\ \frac{l}{6EI} X_1 + \frac{2l}{3EI} X_2 + \frac{ql^2}{24EI} &= 0 \end{aligned}$$

八、(本题 20 分) 用位移法作图 8 所示结构的弯矩图。



令线刚度: $i = EI/l$ $k_{11}Z_1 + F_{1P} = 0$

$k_{11} = 7i$ $F_{1P} = -F_P l/2$ $Z_1 = F_P l/14i$ 由 $M = \bar{M}_1 Z_1 + M_P$ 作最终弯矩图。

九、(本题 10 分) 用力矩分配法作图 9 所示结构的弯矩图。

