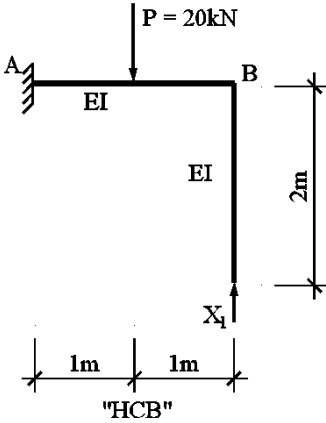
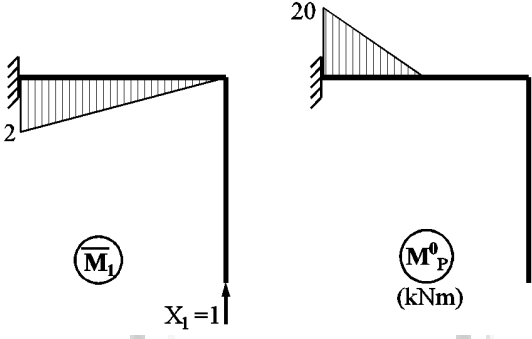
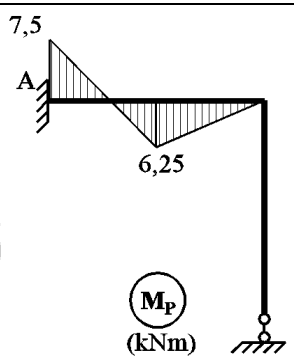
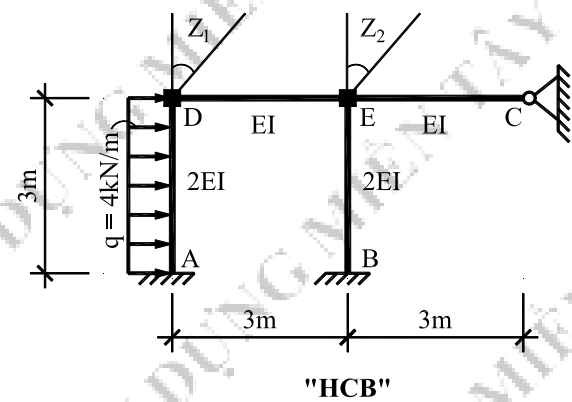
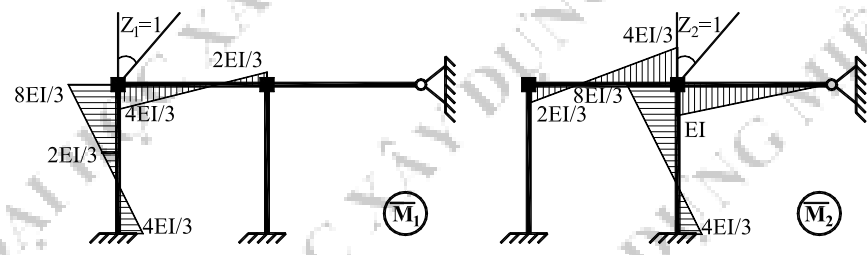
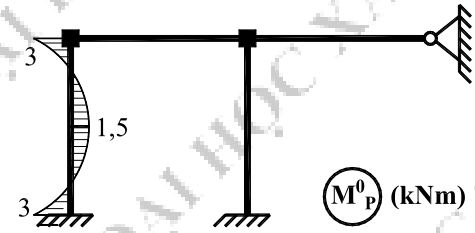
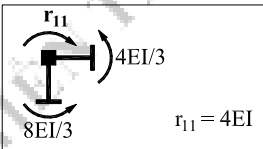
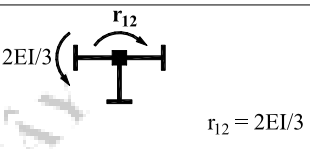
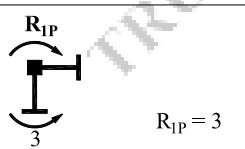
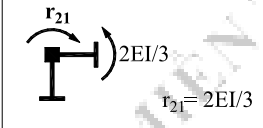
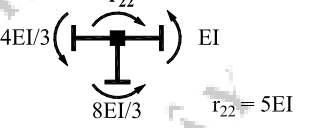
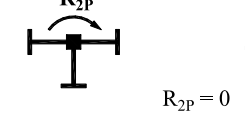
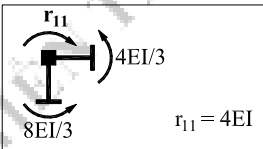
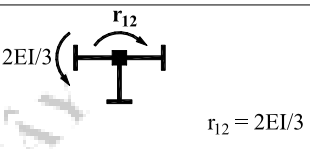
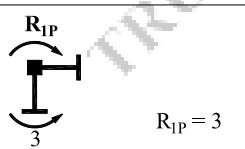
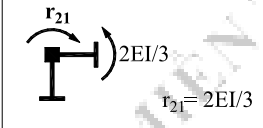
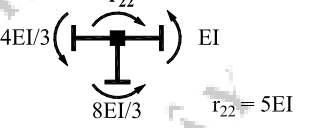
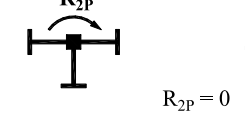
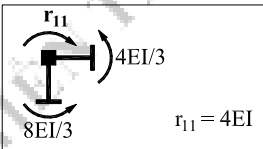
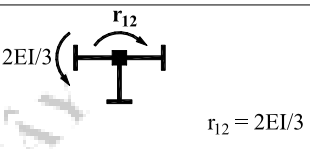
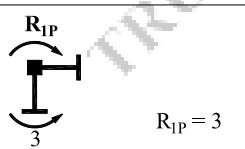
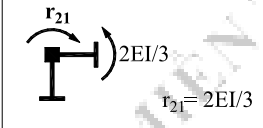
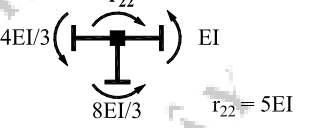
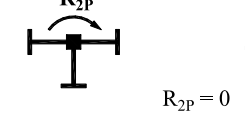
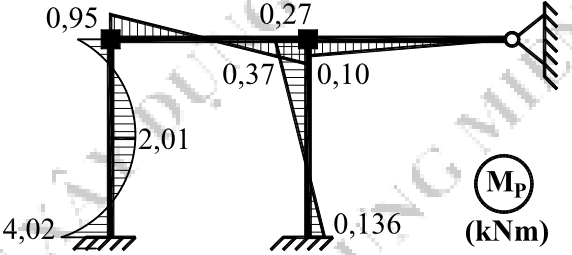


Câu	Nội dung	Thang điểm
1	- Bậc siêu tĩnh $n=3$, $V-K=1$. Chọn hệ cơ bản như hình vẽ: 	0,5
	- Vẽ biểu đồ momen uốn $\overline{M}_1$ và M_p^0 như hình vẽ: 	1,0
	- Phương trình chính tắc: $\delta_{11}.X_1 + \Delta_{1P} = 0$	0,25
	- Tính các hệ số: $\delta_{11} = \frac{(\overline{M}_1) \cdot (\overline{M}_1)}{EI} = \frac{L.h_1.h_3}{3EI} = \frac{8}{3EI}$	0,5
	$\Delta_{1P} = \frac{(\overline{M}_1) \cdot (M_p^0)}{EI} = -\frac{L.h_3}{6EI} (2.h_2 + h_1) = -\frac{50}{3EI}$	0,5
	Giải phương trình: $\frac{8}{3EI}.X_1 - \frac{50}{3EI} = 0 \Rightarrow X_1 = \frac{25}{4} = 6,25kN$	0,25
	- Vẽ biểu đồ momen uốn của hệ như hình vẽ: $M_p = M_p^0 + \overline{M}_1.X_1$	

Câu	Nội dung	Thang điểm
		1,0
Tổng điểm câu 1		4,0đ
2	- Bậc siêu động $n = 2$, chọn hệ cơ bản như hình vẽ 	0,5 0,5
	+ Vẽ biểu đồ mômen uốn M_1, M_2 như hình vẽ. 	0,50 0,50
	+ Vẽ biểu đồ mômen uốn M_p^0 như hình vẽ. 	0,5
	+ Viết hệ phương trình chính tắc $r_{11}Z_1 + r_{12}Z_2 + R_{1P} = 0$ $r_{21}Z_1 + r_{22}Z_2 + R_{2P} = 0$	0,5

Câu	Nội dung	Thang điểm						
	+ Tính các hệ số: <table border="1"> <tr> <td>  $r_{11} = 4EI/3$ </td><td>  $r_{12} = 2EI/3$ </td><td>  $R_{1P} = 3$ </td></tr> <tr> <td>  $r_{21} = 2EI/3$ </td><td>  $r_{22} = 5EI/3$ </td><td>  $R_{2P} = 0$ </td></tr> </table>	 $r_{11} = 4EI/3$	 $r_{12} = 2EI/3$	 $R_{1P} = 3$	 $r_{21} = 2EI/3$	 $r_{22} = 5EI/3$	 $R_{2P} = 0$	0,75 0,75
 $r_{11} = 4EI/3$	 $r_{12} = 2EI/3$	 $R_{1P} = 3$						
 $r_{21} = 2EI/3$	 $r_{22} = 5EI/3$	 $R_{2P} = 0$						
	+ Giải hệ phương trình chính tắc, ta có: $Z_1 = \frac{-135}{176EI} \text{ rad}$ $Z_2 = \frac{9}{88EI} \text{ rad}$	0,25 0,25						
	- Vẽ biểu đồ mô-men của hệ như hình vẽ. $M_p = M_p^0 + (\overline{M}_1)Z_1 + (\overline{M}_2)Z_2$  (kNm)	1,0						
Tổng điểm câu 2		6,0đ						