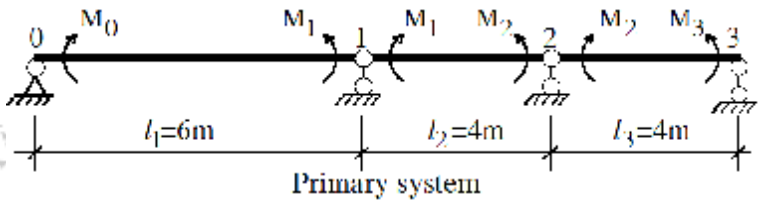
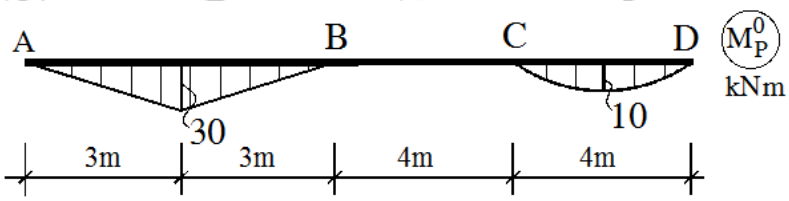
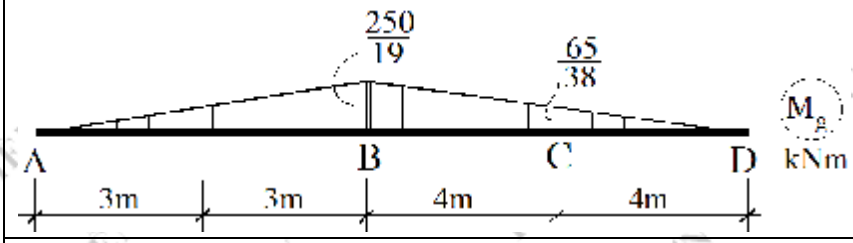
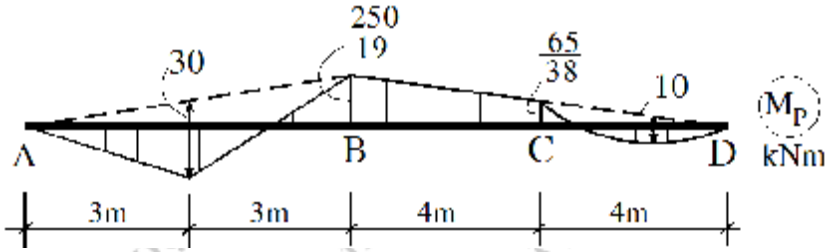
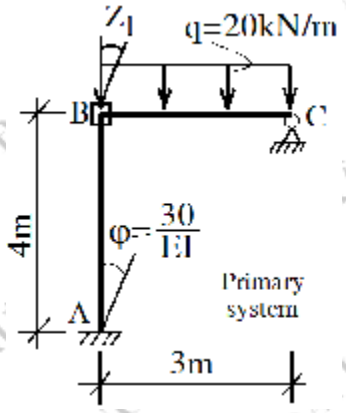
BỘ XÂY DỰNG
TRƯỜNG ĐHXD MIỀN TÂY

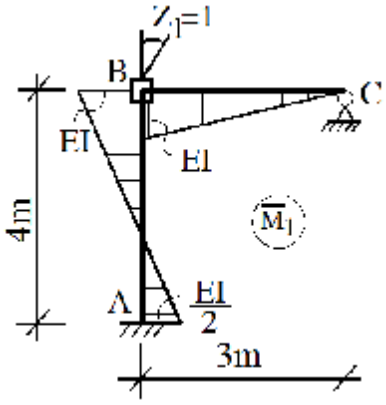
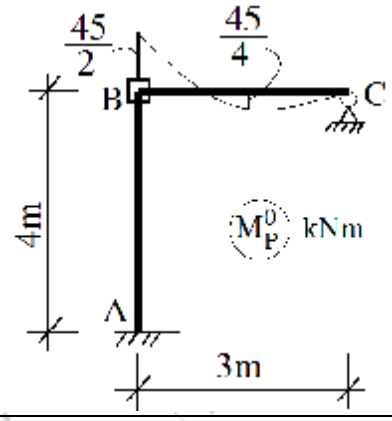
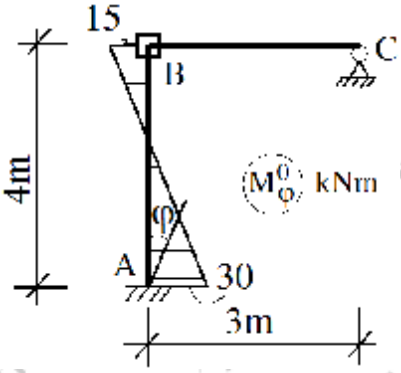
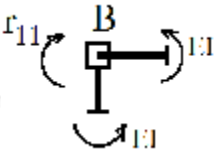
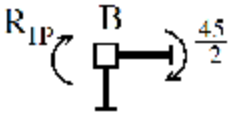
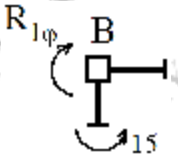
ĐÁP ÁN ĐỀ THI CHÍNH THỨC

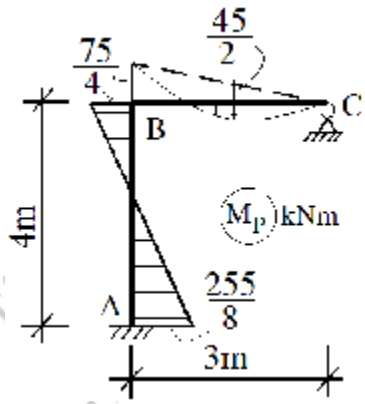
ĐÁP ÁN - THANG ĐIỂM
KỲ THI KTHP HỌC KỲ I NĂM HỌC 2020-2020
Trình độ: ĐẠI HỌC; Ngày thi: 16/12/2020
Môn: CƠ KẾT CẤU 2 (XD19D01)
(Đáp án – Thang điểm gồm 4/4 trang)

Solution:

Problem 1	Part	Content	Marks
		Determine degree of static indeterminacy: $n = C - 3 = 5 - 3 = 2$	0,25
		Draw the simple beam free-body diagram for each span of the beam, label the spans, label the supports, and primary system  	0,5
		Draw the bending moment diagram for each span of the simple beam, M_P^0  	0,5
		Use the three-moment equation for the support 1 $l_1 M_0 + 2(l_1 + l_2) M_1 + l_2 M_2 = -6\left(\frac{w_1 a_1}{l_1} + \frac{w_2 b_2}{l_2}\right)$	0,5
		Use the three-moment equation for the support 2 $l_2 M_1 + 2(l_2 + l_3) M_2 + l_3 M_3 = -6\left(\frac{w_2 a_2}{l_2} + \frac{w_3 b_3}{l_3}\right)$	0,5
		With: $M_0 = M_3 = 0$ $w_1 a_1 = \frac{1}{2} \times 30 \times 6 \times 3 = 270\left(kNm^3\right)$	0,25
		$w_2 b_2 = w_2 a_2 = 0$	0,25
		$w_3 b_3 = \frac{2}{3} \times 10 \times 4 \times 2 = \frac{160}{3}\left(kNm^3\right)$	0,25
		Solve the system of equations	0,25

		$\begin{cases} 20M_1 + 4M_2 = -270 \\ 4M_1 + 16M_2 = -80 \end{cases}$ $\Rightarrow \begin{cases} M_1 = -\frac{250}{19}(kNm) \\ M_2 = -\frac{65}{38}(kNm) \end{cases}$	
		Draw the support moment diagram, M_g  	0,25
		The final moment diagram: $(M_P) = (M_P^0) + (M_g)$  	0,5
Marks obtained for problem 1			**4 points**
Problem 2	**Part**	**Content**	**Marks**
		Determine the degree of kinematical indeterminacy: $n = n_1 + n_2 = 1 + 0 = 1$	0,5
		Let us choose the primary system:  	0,5
		The canonical equation of the displacement method is: $r_{11}Z_1 + R_{1P} + R_{1j} = 0$	0,5
		Construct the bending moment diagrams: $\overline{M_1}$, M_P^0, M_j^0	0,5

			
			0,5
			0,5
		Calculate the main and secondary unit reactions: + r_{11}:  $\Rightarrow r_{11} = 2EI$	0,5
		+ R_{1P}:  $\Rightarrow R_{1P} = -\frac{45}{2}(kNm)$	0,5
		+ $R_{1\varphi}$:  $\Rightarrow R_{1j} = 15(kNm)$	0,5

		Solve the equation: $2EIZ_1 = \frac{15}{2} \Rightarrow Z_1 = \frac{15}{4EI}(rad)$	0,5
		The final bending moment diagram is constructed by a formula: $M_P = \overline{M}_1 Z_1 + M_P^0 + M_j^0$	0,5
			0,5
Marks obtained for problem 2			**6 points**