Remarks: See § 8.2, pages 557 till 575

Answers 8.8: 1:

a) $w(x) = \frac{1}{EI}\left(T\frac{x^2}{2} - Tl\frac{x}{2}\right)$

b) $V(x) = 0$ $M(x) = -T$

c) $\varphi(0) = \frac{Tl}{2EI}$ $\varphi(l) = -\frac{Tl}{2EI}$ $w\left(l/2\right) = -\frac{1}{8}\frac{Tl^2}{EI}$

Answers 8.8: 2:

a) $w(x) = \frac{1}{EI}\left(\frac{T}{l}\frac{x^3}{3} - T\frac{x^2}{2} + Tl\frac{x}{6}\right)$

b) $V(x) = -\frac{2T}{l}$ $M(x) = T - \frac{2T}{l}x$

c) $\varphi(0) = -\frac{Tl}{6EI}$ $\varphi(l) = -\frac{Tl}{6EI}$ $w\left(l/2\right) = 0$

Answers 8.8: 3:

a) $w(x) = \frac{1}{EI}\left(\frac{T}{l}\frac{x^3}{2} - T\frac{x^2}{2}\right)$

b) $V(x) = -\frac{3T}{l}$ $M(x) = T - \frac{3T}{l}x$

c) $\varphi(0) = 0$ $\varphi(l) = -\frac{Tl}{2EI}$ $w\left(l/2\right) = -\frac{Tl^2}{16EI}$

Answers 8.8: 4:

a) Hint: Due to the discontinuity, divide the beam into two parts with suitable boundary conditions:

$$w_1(0)=0 \quad w_2\left(\frac{l}{2}\right)=0$$

$$w_1\left(\frac{l}{2}\right)=w_2\left(\frac{l}{2}\right) \quad w_1'\left(\frac{l}{2}\right)=w_2'\left(\frac{l}{2}\right)$$

$$EIw_1''(0)=-M(0)=0$$

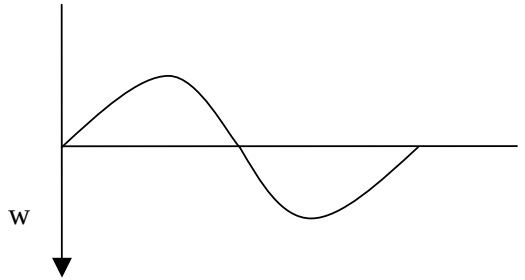
$$EIw_2''(l)=-M(l)=0$$

$$EIw_1''\left(\frac{l}{2}\right)=-M_1\left(\frac{l}{2}\right)=\frac{T}{2}$$

$$EIw_2''\left(\frac{l}{2}\right)=-M_2\left(\frac{l}{2}\right)=-\frac{T}{2}$$

Applying these boundary conditions one gets:

$$w(x)=\begin{array}{l}\dfrac{1}{EI}\left(\dfrac{T}{l}\dfrac{x^3}{6}-Tl\dfrac{x}{24}\right)\rightarrow\left\{0<x<\dfrac{l}{2}\right\}\\ \dfrac{1}{EI}\left(\dfrac{T}{l}\dfrac{x^3}{6}-T\dfrac{x^2}{2}+\dfrac{11}{24}Tlx-\dfrac{1}{8}Tl^2\right)\rightarrow\left\{\dfrac{l}{2}<x<l\right\}\end{array}$$



b) $V(x)=-\dfrac{T}{l}$

$$M(x)=\begin{array}{l}-\dfrac{T}{l}x\rightarrow\left\{0<x<\dfrac{l}{2}\right\}\\ -\dfrac{T}{l}x+T\rightarrow\left\{\dfrac{l}{2}<x<l\right\}\end{array}$$

c) $\varphi(0)=\dfrac{Tl}{24EI}$ $\varphi(l)=\dfrac{Tl}{24EI}$ $w\left(l/2\right)=0$