(ii) $u(x,0)=0$

$$\frac{\partial u}{\partial t}(x,0)=f(x)$$

where $f(x)=\begin{cases} \frac{2M}{L}\cdot x, & 0<x<\frac{L}{2} \\ \frac{2M(L-x)}{L}, & \frac{L}{2}<x<L \end{cases}$

We know:

$X(x)=\sin\left(\frac{n\cdot\pi}{L}\cdot x\right)$

$T(t)=a\sin(c\nu t)+b\cos(c\nu t)$, $\nu=\frac{n\cdot\pi}{L}$

since $u(x,t)=X(x)T(t)$

$u(x,0)=X(x)\cdot T(0)=0$

$\Rightarrow a\cancel{\sin(0)}+b\cos(0)=0=b \Rightarrow b=0$

$\Rightarrow T(t)$ becomes: $T(t)=a\sin(c\nu t)$

and $T'(t)=a\frac{c\,n\cdot\pi}{L}\cdot\cos\left(\frac{n\cdot\pi c}{L}\cdot x\right)$

since $\frac{\partial u}{\partial t}(x,0) = f(x)$

$$\Rightarrow \sum_{n=1}^{\infty} \frac{a_n \cdot c n \cdot \pi}{L} \cdot \sin\left(\frac{n \cdot \pi}{L} \cdot x\right)$$

let $K_n = \frac{a_n c n \cdot \pi}{L}$

then $\sum_{n=1}^{\infty} \frac{a_n c \cdot n \cdot \pi}{L} \cdot \sin\left(\frac{n \cdot \pi}{L} \cdot x\right) = \sum_{n=1}^{\infty} K_n \sin\left(\frac{n \cdot \pi}{L} \cdot x\right)$

Maple:

$$\sum_{n=1}^{\infty} \frac{-4 M\left(\cos\left(\frac{n\pi}{2}\right) - 1\right) \sin\left(\frac{n\pi}{2}\right)}{n \cdot \pi\left(n\pi - \cos(n\pi)\sin(n\pi)\right)} \cdot \sin(n \cdot \pi \cdot x/L) \cdot \cos\left(\frac{c n \pi}{L} \cdot t\right)$$

$\parallel$

$f(x)$ for period in $t = \frac{2\pi}{c n \pi} \cdot L = \boxed{\frac{2L}{cn}}$