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

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

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

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

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

with period (in t) $\frac{2\cancel{\pi}}{c n \cancel{\pi}} \cdot L = \frac{2L}{cn}$