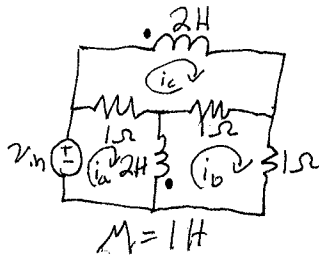


16



$$\text{Loop } i_a \Rightarrow \sum V=0 = -v_{in} + (i_a - i_c)1\Omega + (i_a - i_b)s(2H) - i_c sM$$

$$v_{in} = i_a(2s+1) - i_b(2s) - i_c(s+1)$$

$$\text{or, } v_{in} = 2 \frac{di_a}{dt} + i_a - 2 \frac{di_b}{dt} - \frac{di_c}{dt} - i_c$$

$$\text{Loop } i_b \Rightarrow \sum V=0 = (i_b - i_a)s(2H) + i_c sM + (i_b - i_c)1\Omega + (i_b)1\Omega$$

$$0 = -i_a(2s) + i_b(2s+2) + i_c(s+1)$$

$$\text{or, } 0 = -2 \frac{di_a}{dt} + 2 \frac{di_b}{dt} + 2i_b + \frac{di_c}{dt} - i_c$$

$$\text{Loop } i_c \Rightarrow \sum V=0 = i_c(s \cdot 2H) + (i_b - i_a)sM + (i_c - i_b)1\Omega + (i_c - i_a)1\Omega$$

$$0 = -i_a(s+1) + i_b(s-1) + i_c(2s+2)$$

$$\text{or, } 0 = -\left(\frac{di_a}{dt} + i_a\right) + \frac{di_b}{dt} - i_b + 2 \frac{di_c}{dt} + 2i_c$$