Q7. $T = \frac{1}{2} i_s^2 \frac{d}{d\theta} L_{ss} + \frac{1}{2} i_r^2 \frac{d}{d\theta} L_{rr} + i_s i_r \frac{d}{d\theta} L_{sr}$

$= \frac{1}{2} 0.8^2 \times \frac{d}{d\theta} (2 + \cos 2\theta) \times 10^{-3} + \frac{1}{2} \times 0.01^2 \frac{d}{d\theta} (20 + 8\cos 2\theta) + 0.8 \times 0.01 \frac{d}{d\theta} 0.35 \cos\theta$

$= \frac{1}{2} 0.64 (-2 \sin 2\theta) \times 10^{-3} + \frac{1}{2} \times 1 \times 10^{-4} (-8 \times 2 \sin 2\theta) + 0.08 \times (-0.35 \sin\theta)$

$= -0.64 \times 10^{-3} \sin 2\theta - 0.8 \times 10^{-3} \sin(2\theta) - 2.8 \times 10^{-3} \sin\theta$

$= -1.44 \times 10^{-3} \sin 2\theta - 2.8 \times 10^{-3} \sin\theta$

$T(\theta) = T_1(\theta) + T_2(\theta)$