$$M(q)\ddot{q} + C(q,\dot{q})\dot{q} + K(q) = Q(t), \tag{1}$$

$$\sum (Q_i - m_i\ddot{r}_i) \cdot \delta r_i = 0, \tag{2}$$

$$\frac{d}{dt}\left(\frac{\partial L}{\partial \dot{q}_i}\right) - \frac{\partial L}{\partial q_i} = Q_i, L = T - \Pi \tag{3}$$