Equation of motion for Coin (All symbols have same meaning as given in the question)

Kinetic energy (KE)

$$\frac{m\left(-\frac{r^2\left(\cos^2(\theta_2(t))-2\right)\left(\frac{d}{dt}\theta_1(t)\right)^2}{4}+r^2\left(\frac{d}{dt}\theta_1(t)\right)\sin(\theta_2(t))\left(\frac{d}{dt}\theta_3(t)\right)+\frac{r^2\left(\frac{d}{dt}\theta_2(t)\right)^2}{4}+\frac{r^2\left(\frac{d}{dt}\theta_3(t)\right)^2}{2}+\left(\frac{d}{dt}x(t)\right)^2+\left(\frac{d}{dt}y(t)\right)^2+\left(\frac{d}{dt}z(t)\right)^2\right)}{2}=0$$

Potential energy (PE)

$$mgr\cos(\theta_2(t))=0$$

L := KE - PE

$$\frac{m\left(-\frac{r^2\left(\cos^2(\theta_2(t))-2\right)\left(\frac{d}{dt}\theta_1(t)\right)^2}{4}+r^2\left(\frac{d}{dt}\theta_1(t)\right)\sin(\theta_2(t))\left(\frac{d}{dt}\theta_3(t)\right)+\frac{r^2\left(\frac{d}{dt}\theta_2(t)\right)^2}{4}+\frac{r^2\left(\frac{d}{dt}\theta_3(t)\right)^2}{2}+\left(\frac{d}{dt}x(t)\right)^2+\left(\frac{d}{dt}y(t)\right)^2+\left(\frac{d}{dt}z(t)\right)^2\right)}{2}-mgr\cos(\theta_2(t))=0$$

$$m\left(\frac{d^2}{dt^2}x(t)\right)=0 \qquad \ldots\ldots \quad (eq\ 1)$$

$$m\left(\frac{d^2}{dt^2}y(t)\right)=0 \qquad \ldots\ldots \quad (eq\ 2)$$

$$m\left(\frac{d^2}{dt^2}z(t)\right)=0 \qquad \ldots\ldots \quad (eq\ 3)$$

$$\frac{m\left(r^2\left(\frac{d}{dt}\theta_2(t)\right)\cos(\theta_2(t))\sin(\theta_2(t))\left(\frac{d}{dt}\theta_1(t)\right)-\frac{r^2\left(\cos^2(\theta_2(t))-2\right)\left(\frac{d^2}{dt^2}\theta_1(t)\right)}{2}+r^2\left(\frac{d}{dt}\theta_2(t)\right)\cos(\theta_2(t))\left(\frac{d}{dt}\theta_3(t)\right)+r^2\sin(\theta_2(t))\left(\frac{d^2}{dt^2}\theta_3(t)\right)\right)}{2}=0 \qquad \ldots \quad (eq\ 4)$$

$$\frac{m\,r^2\left(\frac{d^2}{dt^2}\theta_2(t)\right)}{4}-\frac{m\left(\frac{r^2\cos(\theta_2(t))\sin(\theta_2(t))\left(\frac{d}{dt}\theta_1(t)\right)^2}{2}+r^2\left(\frac{d}{dt}\theta_1(t)\right)\cos(\theta_2(t))\left(\frac{d}{dt}\theta_3(t)\right)\right)}{2}-mgr\sin(\theta_2(t))=0 \qquad \ldots\ldots \quad (eq\ 5)$$

$$\frac{m\left(r^2\left(\frac{d^2}{dt^2}\theta_1(t)\right)\sin(\theta_2(t))+r^2\left(\frac{d}{dt}\theta_1(t)\right)\left(\frac{d}{dt}\theta_2(t)\right)\cos(\theta_2(t))+r^2\left(\frac{d^2}{dt^2}\theta_3(t)\right)\right)}{2}=0 \qquad \ldots\ldots \quad (eq\ 6)$$