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

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

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

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

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

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

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