Day-7

→ $m_i = 400$ kg $\quad (g = 10\ ms^{-2})$

$\frac{dm}{dt} = -5\ kg\,s^{-1}$

$v_{gas,\,rocket} = -3500\ ms^{-1}$

$a(0) = ?, \quad a(10) = ?$

Ans) From rocket frame,

$F = \frac{v\,dm}{dt} \quad (v = 3500\ ms^{-1})$

This same force acts on rocket.

So $m\frac{dv}{dt} = \frac{v\,dm}{dt}$

$\Rightarrow a = \frac{v}{m}\frac{dm}{dt} = \frac{3500 \times 5}{400 - 5t}$

$= \frac{3500}{80 - t}\ ms^{-2}$

$a(0) = 43.75\ ms^{-2}$

$a(10) = 50\ ms^{-2}$