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18/ENG05/012

ENG 234

MECHATRONICS ENGINEERING

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1. (F2-3)

$V= (4t-3t^2)\ ms^{-1}$

$t_1= 4s$

$S= 0$

$t= 0$

$S= \int (4t-3t^2)\ ms^{-1}$

$S= \int 4t^2/2 – 3t^3/3$

$S= 2t^2 –t^3$

When t = 4s

$S= 2(4)^2(4)^3$

$S= 32 – 64$

$S= -32m$

2. (F12-4)

$V= (0.5t^3 – 8t)\ ms^{-1}$

$t= 2s$

$a= dv/dt$

$a= 1.5t^2 - 8$

$a= 1.5(2)^2 - 8$

$a= 6 - 8$

$a= -2ms^{-1}$

3. (F12-7)

$a= (4t^2 – 2)\ ms^{-1}$

$S_1= 2m$

$t_1= 2s$

$S_2= 20m$

$t_2= 4s$

$V= \int 4t^3/3 – 2t+C$

$S= \int vdt$

$= \int 4t^2/3 – 2t+C$

$= 4t^4/12 – 2t^2/2 +Ct$

$P= 1t^4/3 – t^2 + Ct + k$

When $t= 0$, $P= 2$

$-2= 1(0)^4/3 – (0)^2 +C (0) + k$

$K= -2$

When $t= 2$, $P=-20$, $k= -2$

$-20= 1(2)^4/3 – 2^2 + C (2) – 2$

$-20= -0.7 + 2C$

$C= -9.7$

$P= 1t^4/3 – t^2 – 9.7t – 2$

When $t= 4$

$P= 1(4)^4/3 – 4^2 – (9.7x4) – 2$

$P= 28.7m$

4. (F12-8)

$V= (20 – 0.05s^2)\ ms^{-1}$

$dv/dt= dv/ds\ .\ ds/dt$

$dv/ds= 0.1s$, $ds/dt= (20 – 0.05s^2)$

$A= (-0.1s)\ (20 – 0.05s^2)$

when $S= 15$

$A= (-0.1x15)\ (20 – (0.05x\ (5)^2))$

$A= -28.125\ ms^{-2}$