2) $a = (4t^2 - 2)\ m/s^2$

$\int a\,dt = v$

$\int v\,dt = s$

$\int a\,dt = \frac{4t^3}{3} - 2t + c = v\,dt$

$\int v\,dt = \frac{4t^4}{12} - \frac{2t^2}{2} + ct$

$s = \frac{t^4}{3} - t^2 + ct$

when $t = 0$, $s = -2m$

$-2 = \frac{0^4}{3} - 0^2 + c(0) + z$

$z = -2$

when $t = 2$, $s = -20\ m$

$-20 = \frac{2^4}{3} - 2^2 + c(2) - 2$

$-20 = 5.33 - 4 + 2c - 2$

$-20 = -0.67 + 2c$

$c = -9.67$

hence when $t = 4s$

$s = \frac{4^4}{3} - 4^2 - 9.67(4) - 2$

$= 85.33 - 16 - 36.68 - 2$

$s = 28.65m$

$\frac{t^4}{3} - t^2$

$= 0$

$2 \quad 0 - \left(\frac{(4)^4}{3} - (4)^2\right)$

$s = -81.33\,m$ to the left of the

(3) $v = (0.5t^3 - 8t)\,m/s$

Determine the acceleration of

$$a = \frac{dv}{dt}$$

$$a = \frac{d(0.5t^3 - 8t)\,m/s}{dt}$$

$$a = 1.5t^2 - 8\ m/s^2$$

At $t = 2secs$

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

$a = -2m/s^2$

(4) $v = (20 - 0.05s^2)$ m/s

Determine the acceleration of the particle at $s = 15$m.

Soln.

$$a = \frac{dv}{dt} \qquad v = \frac{ds}{dt}$$

$$dt = \frac{dv}{a} = \frac{ds}{v}$$

$$a\,ds = v\,dv$$

$$a = \frac{v\,dv}{ds}$$

$$a = (20 - 0.05s)(-0.1s)$$

At 15m

$$a = (20 - (0.05 \times 15^2))(-0.1 \times 15)$$

$$a = (20 - 11.25)(-1.5)$$

$$a = -13.125 \text{ m/s}^2$$

NAME: SULE MUBARAK A.
DEPT: CIVIL ENGINEERING
MAT No.: 18/ENG03/055
COURSE: ENGINEERING MECHANICS
DATE: 29 - 04 - 2020

ASSIGNMENT

$v = (4t - 3t^2)\ m/s$

Determine the position of the particle when $t = 4s$

Soln.

$V = (4t - 3t^2)\ m/s$

$v = \frac{ds}{dt}$

$ds = v\,dt$

$\int ds = \int v \cdot dt$

$s = \int_0^4 (4t - 3t^2) \cdot dt$

$s = \frac{4t^2}{2} - \frac{3t^3}{3} \Big|_0^4$

$s = 2t^2 - t^3 \quad (0 \to 4s)$

$s = 2(4)^2 - (4)^3$

$s = 32 - 64 = -32m$

$s = 0 - (2(4)^2 - (4)^3)$

$s = 32m$

$a = (4t^2 - 2)\ m/s^2$