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18/ENGA02/100.

COMPUTER ENGINEERING

FL MECHANICS ASSIGNMENT

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

$$\frac{dv}{dt} = 4 - 6t.$$

when $t = 4$.

$$\frac{dv}{dt} = 4 - 6(4).$$

$$\frac{dv}{dt} = 4 - 24.$$

$$\frac{dv}{dt} = -20 \text{ m/s}^2$$

i.e deceleration.

distance at 4secs.

$$V^2 = u^2 + 2as$$

$$a = \frac{v-u}{t}.$$

$$20 = \frac{v-0}{4}.$$

$$80 = v$$

$$v^2 = u^2 + 2as$$

$$(80)^2 = (0)^2 + 2(20)(s)$$

$$6400 = 40s$$

$$s = \frac{6400}{40}$$

$$s = 160 \text{ m}$$

$$\textcircled{2} a = (4t^2 - 2).$$

$$\frac{dv}{dt} = 8t$$

$$dv = 8t dt$$

$$\int dv = \int 8t dt$$

$$v = \frac{8t^2}{2} + c$$

$$v = 4t^2 + c$$

when $t = 0$, $c = -2 \text{ m/s}^2$.

$$v = 4(0)^2 - 2$$

$$v = -2 \text{ m/s at } 2 \text{ m/s}^2$$

when $t = 2 \text{ s}$, $c = 20 \text{ m/s}^2$.

$$v = 4(2)^2 + 20$$

$$v = 36 \text{ m/s at } 20 \text{ m/s}^2.$$

$$a = \frac{v-u}{t} = \frac{36-2}{4}$$

$$a = \frac{34}{4}$$

$$= 8.5 \text{ m/s}^2$$

from $V^2 = u^2 + 2as$.

$$(36)^2 = (2)^2 + 2(8.5)s$$

$$1296 = 4 + 17s$$

$$1296 = 21s$$

$$S = \frac{1296}{21}$$

$$S = 61.714m$$

⑤ $V = (0.5t^3 - 8t)$

when $t = 2s$.

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

$$V = (0.5t^3 - 8t)$$

$$\frac{dv}{dt} = 1.5t^2 - 8$$

when $t = 2s$

$$\frac{dv}{dt} = 1.5(2)^2 - 8$$

$$\frac{dv}{dt} = 6.8$$

$$\frac{dv}{dt} = -2 m/s^2$$

It is decelerating at $-2 m/s^2$.

④ $V = (20 - 0.05s^2) m/s$

$$V = ds/dt$$

$$1/V = dv/ds \dots \dots \dots (i)$$

$$dv/ds = 0 - (0.1)s$$

where $S = 15m$.

$$dv/ds = -0.1(15)$$

$$dv/ds = -1.5 \dots \dots (ii)$$

from eqn (i)

$$1/V = dv/ds$$

$$1/V = -1.5$$

$$V = \frac{1}{-1.5}$$

$$V = 0.67 m/s$$

Get acceleration using

$$V^2 = u^2 + 2as$$

$$(0.67)^2 = (0)^2 + 2(a)(15)$$

$$0.4489 = 30a$$

$$a = \frac{0.4489}{30}$$

$$a = 0.015 m/s^2$$