Start here for Question Number: 7

i. $\ddot{x} = 4\cos 2t$

$\dot{x} = 4 \times \frac{1}{2} \sin 2t$

$= 2\sin 2t = 1$ (since particle has velocity = 1 initially at origin)

$\therefore \dot{x} = 2\sin 2t + 1$

ii. At rest when, $\dot{x} = 0$

$2\sin 2t + 1 = 0$

$\sin 2t = -\frac{1}{2}$

$t = -\frac{1}{2} \div \sin 2 = 14.3m$

iii. $\dot{x} = 2\sin 2t + 1$

$\dot{x} = -2 \times \frac{1}{2} \cos 2t + x$

$= -\cos 2t + x$

b. $y = x^2$

$y' = 2x$

when $x = -1$, $y' = -2$

$\therefore$ eqn of tangent at $(-1, 1)$ is

$y - y_1 = m(x - x_1)$

$y - 1 = -2(x + 1)$

$y - 1 = -2x - 2$

$-2x - y - 1 = 0$

$\therefore$ eqn of tangent $= 2x + y + 1 = 0$ #

ii. [redacted]

$m_{(AB)}$ = m tangent at C

$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ (-1, 1), (2, 4)

$= \frac{-1+2}{2}, \frac{1+4}{2}$

$= \left(\frac{1}{2}, \frac{5}{2}\right)$

iii. tangent at A is $2x+y+1=0$

$\therefore m = -2$

Additional writing space on back page.