* EXAMPLE

Worker guaranteed (يعني) wage (اجره) of SR 5/hr.

ساعة لعامل بخمسه ريال سواءً انتج او لم ينتج

also earns SR 1.5/unit

The unit sold at a price of $5 - 0.4t$ SR/unit

Where: t = No. of unit per hour.

* At what rate of production will the company earn the most profit from this worker's output ?

Fixed Cost = FC = 5 SR/hr

Variable Cost = VC(t) = $1.5t$

$\therefore TC(t) = 5 + 1.5t$ *

$TR(t) = R(t) * t$

$TR(t) = (5 - 0.4t) * t$

$TR(t) = 5t - 0.4t^2$ *

$TP(t) = TR(t) - TC(t)$

$TP(t) = 5t - 0.4t^2 - 5 - 1.5t$

$TP(t) = 3.5t - 0.4t^2 - 5$ *

$$\frac{dTP(t)}{dt} = 0 \Rightarrow 3.5 - 0.8t = 0 \Rightarrow t = 4.375 \text{ unit/hr.}$$

* Find max profit from this worker ?

$$\frac{dTP(t)}{dt} = 0 \Rightarrow t = 4.375$$

$$TP(t) = 3.5t - 0.4(t)^2 - 5$$

at $t = 4.375 \longrightarrow$ Max TP

$$TP(4.375) = 3.5(4.375) - 0.4(4.375)^2 - 5$$

$$TP(4.375) = 2.656 \text{ SR/hr.}$$

* Find TP when TR is max ?

Find $t \longrightarrow$ Max $TR(t)$ $\qquad TR(t) = 5t - 0.4t^2$

$$\frac{dTR(t)}{dt} = 0 \Rightarrow 5 - 0.8t = 0 \Rightarrow t = 6.25 \text{ unit/hr.}$$

$$TP(6.25) = 3.5(6.25) - 0.4(6.25)^2 - 5$$

$$TP(6.25) = \text{SR } 1.5/\text{hr.}$$

* Find Break - Even point ?

$TC = TR$ at break - Even point

$TR - TC = 0$

or

$TP = 0$

$3.5(t) - 0.4t^2 - 5 = 0$

by $t = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$t_1 = 1.798$ unit/hr.

$t_2 = 6.952$ unit/hr.

* Exam Question:

$$TC(x) = 10{,}000 + 7.5x + 0.01x^2$$
$$SP = R(x) = 40 - 0.01x$$

a) If production $t = 700$; Should the increase production?
b) If production $t = 900$; Should the increase production?

$$TC(x) = 10{,}000 + 7.5x + 0.01x^2 \ *$$
$$TR(x) = (40 - 0.01x)\,x$$
$$\therefore TR(x) = 40x - 0.01x^2 \ *$$

a) at $t = 700$

$$MC = \frac{dTC(x)}{dx} = 0.02x + 7.5$$

$$MTR = \frac{dTR(x)}{dx} = 40 - 0.02x$$

t	MC	MTR	Increase prod. or not
700	21.5	26	Increase of production
900	25.5	22	no increase of production