AND { 0 0 → 0
0 1 → 0
1 0 → 0
1 1 → 1

For input 01: For 0, 0 → slide

For p=1

$y_a(1) = step\left[\left(\sum_{i=1}^{2} x_i w_i\right) - \theta\right]$

$= step(-0.1 - 0.2)$ | $x_i w_i = 0 \times 0.3 + 1 \times (-0.1)$

$= step(-0.3)$ $= 0 - 0.1 = -0.1$

$= 0$ | $\because step(x<0 = 0)$ $(x>0 = 1)$

$e(1) = y_d - y_a = 0 - 0 = 0$ | since, there is no loss/error the weight will remain same.

$\therefore w_1(p+1) = w_1(2) = w_1(1) + (\alpha * x_1(p) * e(p))$

$= 0.3 + (0.1 * 0 * 0)$

$= 0.3$

$w_2(2) = w_2(1) + \alpha * x_2(p) * e(p)$

$= -0.1 + 0.1 * 0 * 0$

$= -0.1$

For p = 2: $x_1 = 0$, $x_2 = 1$

$\Sigma x_i w_i = 0 * 0.3 + 1 * (-0.1) = -0.1$

$\Rightarrow y_a = step(-0.1 - 0.2) = step(-0.3) = 0$

$\Rightarrow e(2) = y_d - y_a = 0 - 0 = 0$ | so, weight will not update.

$\Rightarrow w_1(2+1) = w_1(3) = w_1(2) + \alpha * x_1(p+1) * e(p+1)$

$= w_1(2) + \alpha * x_1(2) * e(2)$

$= 0.3 + 0.1 \times 0 \times 0 = 0.3$

$\Rightarrow w_2(3) = w_2(2) + \alpha * x_2(2) * e(2)$

$= -0.1 + 0.1 * 1 * 0$ | $\therefore [0.3 \ -0.1]$ remain unchanged

$= -0.1$

$1 0 \rightarrow 0$

For P=3, $x_1 = 1, x_2 = 0$

$$\sum x_i w_i = x_1 w_1 + x_2 w_2 = 1 \times 0.3 + 0 \times (-0.1)$$
$$= 0.3 + 0 = 0.3$$

$\therefore y_a = \text{step}(\sum x_i w_i) = \text{step}(0.3) = 1$

$\therefore$ Error/loss $= y_d - y_a = 0 - 1 = -1$
$e(3)$

Since, there are some loss, the weight will be updated:-

$$\# w_1(3+1) = w_1(4) = w_1(3) + \alpha * x_1(3) * e(3) = 0.3 + 0.1 \times 1 \times (-1)$$
$$= 0.3 - 0.1 = 0.2$$

$\Rightarrow w_1(4) = 0.2$

$$\# w_2(3+1) = w_2(4) = w_2(3) + \alpha * x_2(3) * e(3)$$
$$= -0.1 + 0.1 \times 0 \times (-1)$$
$$= -0.1$$

$\therefore (w_1, w_2) = (0.2, -0.1)$ ↵

For P=4: $x_1 = 1, x_2 = 1$

$$\sum x_i w_i = x_1 w_1 + x_2 w_2 = 1 * 0.2 + 1 (-0.1) = 0.2 - 0.1$$
$$= 0.1$$

$\Rightarrow y_a = \text{step}(0.1) = 1$

$\therefore e(4) = y_d - y_a = 1 - 1 = 0$

$$\therefore w_1(4+1) = w_1(5) = w_1(4) + \alpha * x_1(4) * e(4)$$
$$= 0.2 + 0.1 \times 1 \times 0 = 0.2$$

$$\therefore w_2(4+1) = w_2(5) = w_2(4) + \alpha \times x_2(4) \times e(4)$$
$$= -0.1 + 0.1 \times 1 \times 0$$
$$= -0.1$$

$\therefore (w_1(5), w_2(5)) = (0.2, -0.1)$