Given,

Q-3 → Dimension of input given $= 1 \times 64 \times 64$

Dimension of filter $= 7 \times 5 \times 5$

Stride $= 2$

1st set:-

width and height of first tensor $= \dfrac{W + 2P - F}{S} + 1$

$$= \dfrac{64 + 0 - 5}{2} + 1$$

$$= 30.5$$

$$\approx 30$$

So, Dimension after

1st set convolution $= 7 \times 30 \times 30$

After max pooling $= 7 \times \dfrac{30}{2} \times \dfrac{30}{2}$

$$= 7 \times 15 \times 15.$$

2nd set:-

As the pixels on the dimension is reduced to 15×15.
We will increase the number of filter. (double the filter).

∴ Dimension of filter $= 14 \times 5 \times 5$

Width and height of second tensor $=$

$$\dfrac{W + 2P - F}{S} + 1$$

$$= \dfrac{15 + 0 - 5}{2} + 1$$

$$= 6$$

∴ Dimension of second tensor $= 14 \times 6 \times 6$

After max pooling $= 14 \times \dfrac{6}{2} \times \dfrac{6}{2}$

$$= 14 \times 3 \times 3.$$

3rd set

We will increase the dimension of the filter as dimension decreased.

Dimension of filter $= 28 \times 5 \times 5$.

Dimension of image $= 14 \times 3 \times 3$

Width and height of third tensor $= \dfrac{W + 2P - F}{S} + 1$

$$= \dfrac{3 - 5}{2} + 1$$

$$= 0$$

Here, the dot product cannot be computed in 3×3 matrix and 5×5 matrix. So, we will take the previous set output which is $14 \times 3 \times 3$.

So, number of nodes in flattening layer $= 126$.

Another approach :-

As filter dimension is greater than input dimension of image, we can add padding in both height and weight. So, after padding :-

Dimension of third tensor $= \dfrac{W + 2P - F}{2} + 1$

$$= \dfrac{3 + 2 \cdot 1 - 5}{2} + 1$$

$$= \dfrac{5 - 5}{2} + 1$$

$$= 1$$

So, dimension $= 28 \times 1 \times 1$

Dimension after max pooling $= 28 \times 1 \times 1$

So, number of nodes after flattening $= 28$ (Ans.)