a) As $C_n$ has n vertices $\{0, 1, \ldots, n-1\}$, so $C_n \times C_n$ has $n^2$ vertices. Namely,

$$C_n \times C_n = \{(p, q) : p \in C_n, q \in C_n\}$$

b) To show that $C_n \times C_n$ is 4-regular. For this let n=7, then

Let $1 \le p \le 5, 1 \le q \le 5$, then the 4 neighbours of the point $(p, q)$ are namely,

$$(p-1, q), (p+1, q), (p, q-1), (p, q+1)$$

note that $2 \le p+1 \le 6$ and $2 \le q+1 \le 6$, and

$0 \le p-1 \le 4, 0 \le q-1 \le 4$

Hence each of the points are in $C_n \times C_n$. These points are shown in the graph below where the vertices of $C_7 \times C_7$ have been drawn (see the points written in red coloured pen).

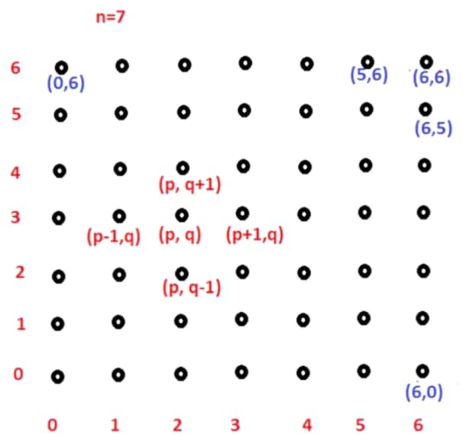
Then if a point is of the type $(p, q)$ where $p, q$ are either 0 or 6, then we have to use the modulo 6.

Thus in this case the 4 neighbours of the point $(p, q)$ are namely,

$(p-1(mod\ n), q), (p+1(mod\ n), q), (p, q-1(mod\ n)), (p, q+1(mod\ n))$

(for example see written in blue coloured pen.)

Hence $C_n \times C_n$ is 4-regular.



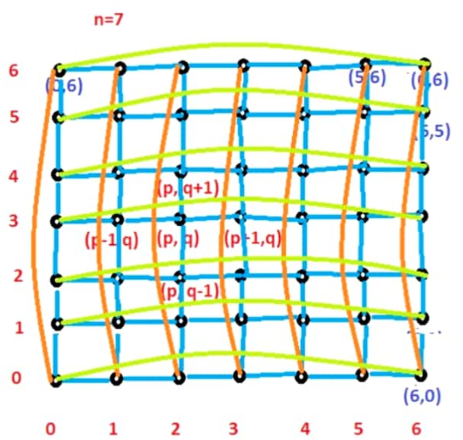

(6,6) has four neighbourhood vertices (5,6), (0, 6), (6,5) and (6,0)

c) For the number of edges of $C_n \times C_n$ observe that there are $n$ horizontal edges in each row and as there are n rows in all, so $n^2$ edges which are horizontal ,

, and similarly, n vertical edges in each row and as there are n vertical in all, so $n^2$ edges which are vertical ,

Thus total number of edges is $n^2 + n^2 = 2n^2$.

For example




The number of edges are 7x7+7x7=98