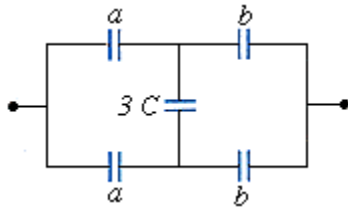Q- Determine the equivalent capacitance of the combination shown in Figure, where $a = 10C$ and $b = 45C$.

As the upper and lower branches are symmetric and parallel, the potential difference across the capacitor 3C will be zero and the capacitor will not get any charge. Thus the circuit can be considered as the parallel combinations of two branches with a and b in series.

The equivalent capacitance of a and b in series will be

$$\frac{ab}{a+b} = \frac{10C*45C}{10C+45C} = \frac{90C}{11}$$

As the equivalent circuit is the parallel combination of the two series, its capacitance is given by

$$C_{equivalent} = 2 * \frac{90C}{11} = \frac{180C}{11} = 16.4\ C$$