Q- Two capacitors C_1 = 30 μF and C_2 = 60 μF are connected in series with a 12 V battery. Find

(a) The charge on C_1 and

(b) The potential difference across C_2.

When two or more than two capacitors are connected in series the voltage across the combination is distributed between them. The equivalent capacitance is given by

$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2}$$

Or $$C_{eq} = \frac{C_1 C_2}{C_1 + C_2} = \frac{30*10^{-6}*60*10^{-6}}{30*10^{-6} + 60*10^{-6}} = 20 * 10^{-6} F$$

(a) The charge on the combination is given by

$Q = CV = 20*10^{-6}*12 = 2.4*10^{-4}$ C

In series combination of capacitors charge on each capacitor will be same which is equal to the charge from battery thus the charge on capacitor C_1 will also be **$2.4*10^{-4}$ C**.

(b) The charge on C_2 is also $2.4*10^{-4}$ C, thus the potential difference across C_2 is given by

$V_2 = Q_2/C_2 = 2.4*10^{-4} / 60*10^{-6}$ = **4.0 V**