E. Arrambide | Physics AP/Dual

Name: Key Period: ____ Date: ____

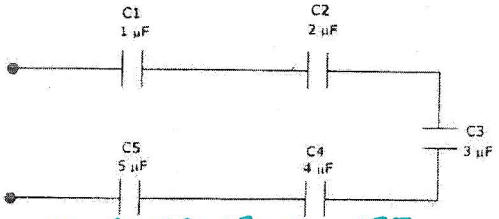
Electricity: Capacitors Problems I

SERIES	PARALLEL	
$\frac{1}{C_T} = \frac{1}{C_1} + \frac{1}{C_2} + \cdots$	$C_T = C_1 + C_2 + \cdots$	
$C = \frac{Q}{V}$	$C = \varepsilon_o \frac{A}{d}$	$U = \frac{1}{2} Q \Delta V = \frac{1}{2} CV^2$

I. Simplify the following electric circuits and answer the following.

1. Series

$\frac{1}{C} = \frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5}$



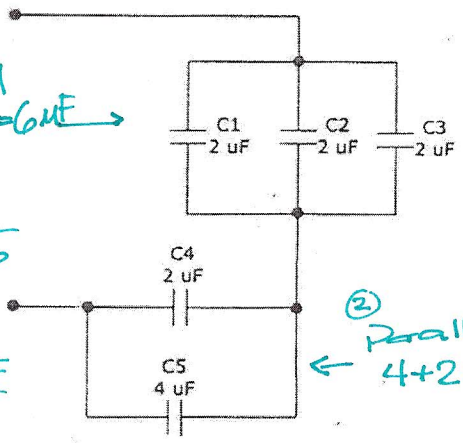
$\frac{1}{C} = \frac{60+30+20+15+12}{60} = \frac{137}{60}$

$\frac{1}{C} = \frac{60}{137}$ $C = \frac{60}{137} = 0.44\,\mu F$

Type of circuit: Series

Total Capacitance: 0.44μF

2.



① Parallel $2+2+2 = 6\,\mu F$

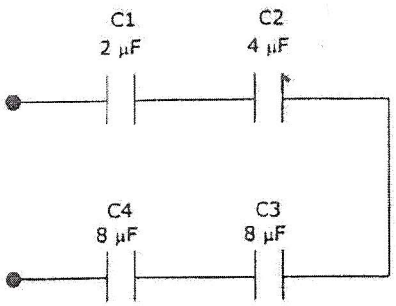
③ Series $\frac{1}{C} = \frac{1}{6} + \frac{1}{6}$ $\frac{1}{C} = \frac{2}{6}$ $C = \frac{6}{2} = 3\,\mu F$

② Parallel $4+2 = 6\,\mu F$

Type of circuit: Combined

Total Capacitance: 3μF

3.



Type of circuit: Series

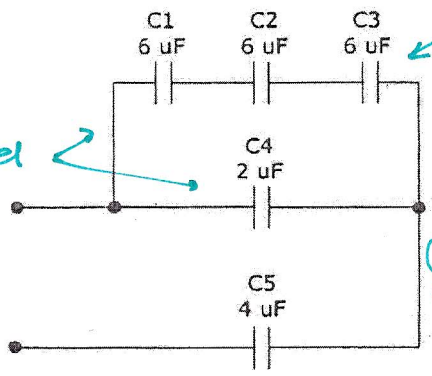
Total Capacitance: 1μF

$\frac{1}{C} = \frac{1}{2} + \frac{1}{4} + \frac{1}{8} + \frac{1}{8}$

$\frac{1}{C} = \frac{4+2+1+1}{8} = \frac{8}{8}$

$C = 1\,\mu F$

4.



① Series $\frac{1}{C} = \frac{1}{6} + \frac{1}{6} + \frac{1}{6}$ $\frac{1}{C} = \frac{3}{6}$ $C = \frac{6}{3} = 2\,\mu F$

② Parallel $C_T = 2+2$ $C_T = 4$

③ Series $\frac{1}{C_T} = \frac{1}{4} + \frac{1}{4}$ $\frac{1}{C_T} = \frac{2}{4}$ $C_T = \frac{4}{2}$ $C_T = 2$

Type of circuit: Combined

Total Capacitance: 2μF