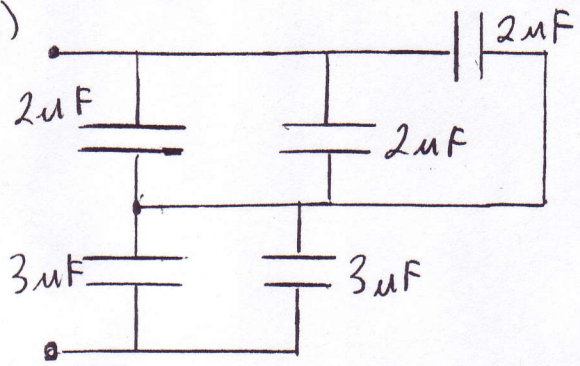
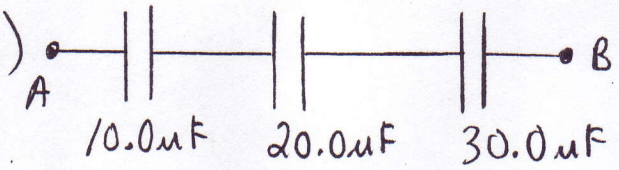
2a) Find the equivalent capacitance of the system of capacitors shown below in figure (a). (4)
b) Consider the capacitors shown in figure (b) below. If none of the capacitors can withstand a potential difference of more than 100 V without failure, what is the maximum potential difference that can be applied across points A and B without inducing a failure? (4 marks)

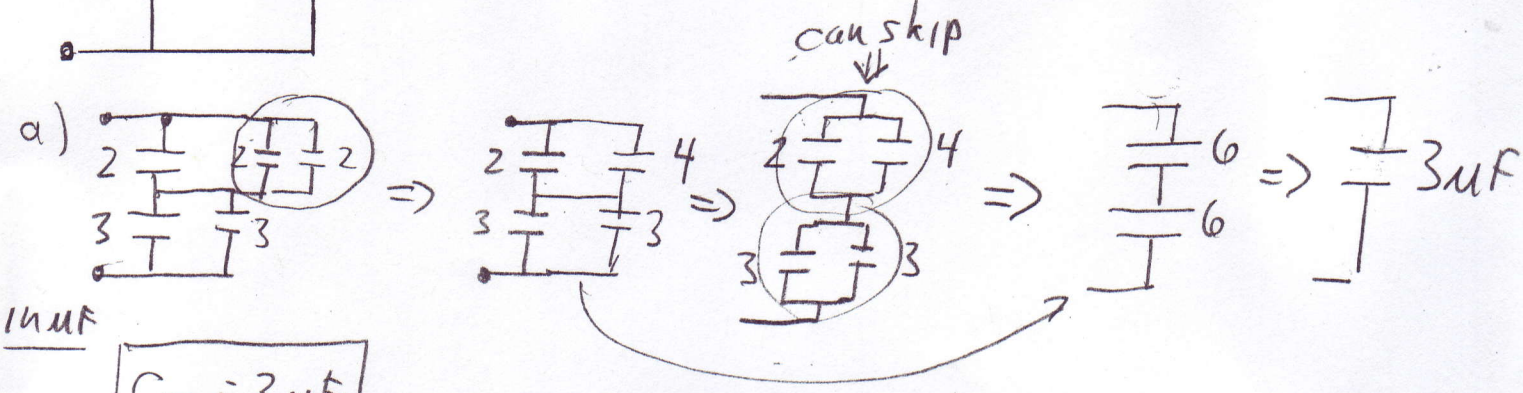
a)



b)



a)



1/1μF

$C_{eq} = 3\mu F$

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b) $\frac{1}{C_{eq}} = \frac{1}{10.0} + \frac{1}{20.0} + \frac{1}{30.0} \Rightarrow$ $C_{eq} = 5.45\ \mu F$

$Q = C\Delta V = (5.45\times10^{-6})V_{applied} \Rightarrow$ $Q = 5.45\times10^{-6}\ V_{applied}$

Since the capacitors are in series each capacitor has the charge. From $\Delta V = Q/C$ the 10.0μF capacitor will have the highest voltage.

$100 = \frac{5.45\times10^{-6}V_{applied}}{10^{-5}} \Rightarrow$ $V_{applied} = 184\ V$