Module 4: Capacitance and capacitor

Q1. What is the capacitance of a capacitor that stores 10 C when the voltage across it is 10 V?

A 1 F **(BRAVO! $c = \frac{q}{V}$)**

B 50 F

C 10 F

D 100 F

B,C,D prompt: (Incorrect, review lecture 4.1_Capacitor)

Q2. An electric potential is applied to a parallel-plate capacitor. In order to increase the energy stored in the capacitor, we can

A increase the separation between the two plates (Incorrect statement, review lectures 4.1_Capacitor, 4.2_Capacitor-Stored Energy & 4.3_Dielectric)

B increase the area of the plates (Correct statement, but there is another true statement)

C insert a dielectric between the plates (Correct statement, but there is another true statement)

D two of the above **(BRAVO! $U = \frac{1}{2}cV^2$, $c = \kappa\epsilon_0\frac{A}{d}$)**

E none of the above (Incorrect, review lectures 4.1_Capacitor, 4.2_Capacitor-Stored Energy & 4.3_Dielectric)

F all of the above (Incorrect, review lectures 4.1_Capacitor, 4.2_Capacitor-Stored Energy & 4.3_Dielectric)

Q3. A dielectric material is initially inserted between the parallel plates of a capacitor. The capacitor is then charged to a potential (V) and the dielectric material is removed afterwards. The electrostatic energy stored in the capacitor is

A the same as

B smaller than

C greater than **(BRAVO! $= \frac{Q^2}{2C}$, Q remains the same while C decreases)**

it would have been if the dielectric material were left in between the plates.

A,B prompt: (Incorrect, review lecture 4.3.1_Dielectric Example)

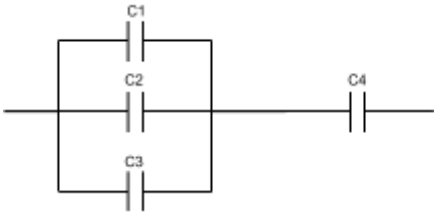
Q4. Two identical capacitors can be connected in series or parallel. Which combination will result in smaller capacitance?

A parallel (Incorrect, $C_{total} = \sum_1^n C_j$, review lecture 4.4_Capacitive Network)

B series **(BRAVO!)**

C neither parallel nor series (Incorrect, review lecture 4. 4_Capacitive Network)

Q5. In the following arrangement, C1 = C2 = C3 = ¼F and C4 = ½F. The total equivalent capacitance is given by the expression:



A $\frac{37}{18}$ F

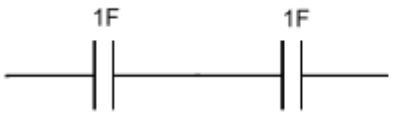
B $\frac{2}{5}$ F **(BRAVO!** C' = C1 + C2 + C3 which are then combined in series with C4: $C_{total} = \left[\frac{1}{C'} + \frac{1}{C4}\right]^{-1}$ **)**

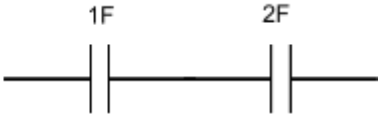
C $\frac{13}{162}$ F

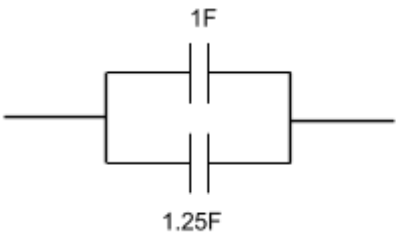
D $\frac{162}{13}$ F

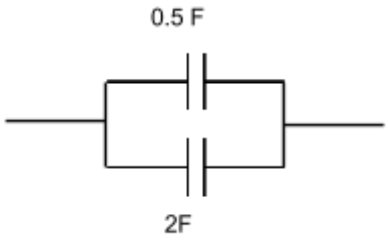
A,C,D prompt: (Incorrect, review lecture 4. 4_Capacitive Network)

Q6. Which of the following arrangements will result in the largest total energy storage in the circuit assuming the same voltage (electric potential) is applied to the two ends?

A


C


B


D


A,B,C prompt: (Incorrect, review lecture 4. 4_Capacitive Network)

D **(BRAVO! $U = \frac{1}{2}cV^2$ energy is proportional to the capacitance)**