ODM EDUCATIONAL GROUP
Changing your Tomorrow

COMBINATION OF CAPACITORS IN SERIES AND IN PARALLEL

CLASS-XII

SUBJECT : PHYSICS
CHAPTER NUMBER: 02
CHAPTER NAME : ELECTROSTATIC POTENTIAL AND CAPACITANCE

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LEARNING OUTCOME

After this lesson, students will be able:

- To derive expressions for total capacitance in series and in parallel
- To identify series and parallel parts in the combination of connection of capacitors.
- To Calculate the effective capacitance in series and parallel given individual capacitances.
- To list three factors that determine the capacitance of a capacitor..

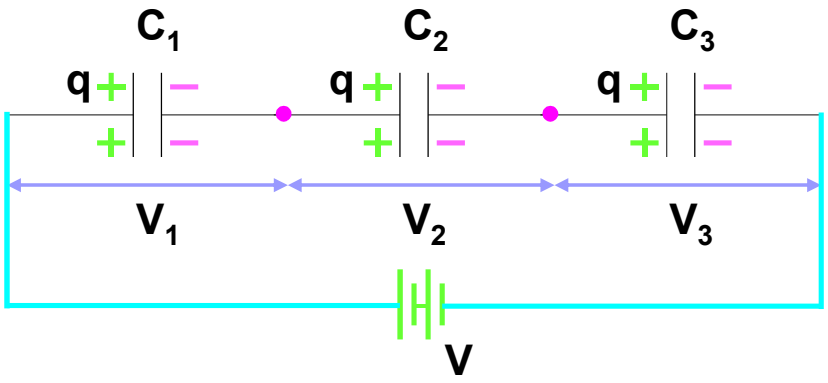
Slide 2

1	@Format for content and slide heading is missing? Just like you have mentioned in DOC., We need to specify, for each slide's heading and text content, what will be the font style +amanrouniyar@odmegroup.org _Assigned to you_ -Swoyan Satyendu , 6/17/2020

REVIEW

1. What are capacitors ?
2. What is the capacitance of an isolated capacitor?
3. What is the relation between dielectric constant and polarization vector?

SERIES COMBINATION OF CAPACITORS:



In series combination,

i) Charge is same in each capacitor

ii) Potential is distributed in inverse proportion to capacitances

$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$$

$$\frac{1}{C} = \sum_{i=1}^{n} \frac{1}{C_i}$$

Note: The effective capacitance in series combination is less than the least of all the individual capacitances.

PARALLEL COMBINATION OF CAPACITORS:

In parallel combination,

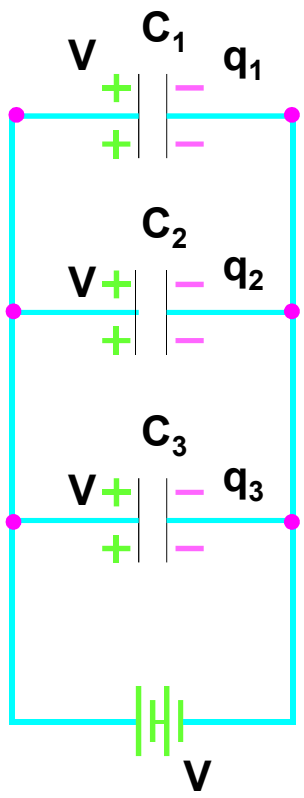
i) Potential is same across each capacitor

ii) Charge is distributed in direct proportion to capacitances

$$C = C_1 + C_2 + C_3$$

, ,

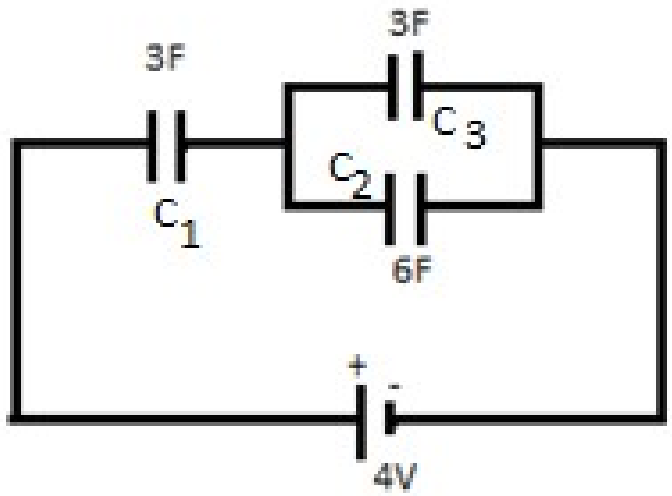
$$\therefore C = \sum_{i=1}^{n} C_i$$



Note: The effective capacitance in parallel combination is larger than the largest of all the individual capacitances.

Numerical

Question: In the circuit diagram find out the charge of the capacitors C_1, C_2, and C_3.



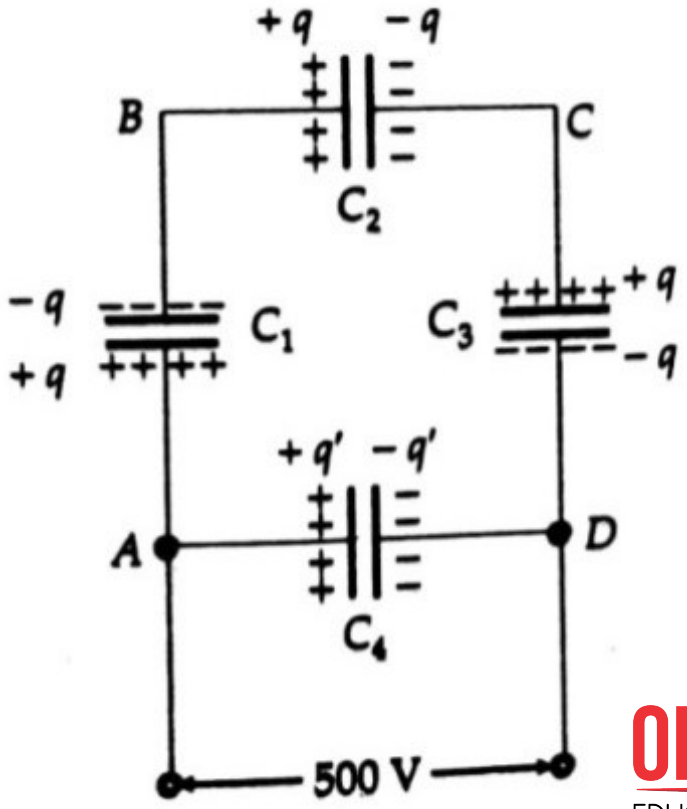
Numerical

Question:

A network of four 10 μF capacitors is connected to a 500V supply as shown Determine

a) the equivalent capacitance of the network

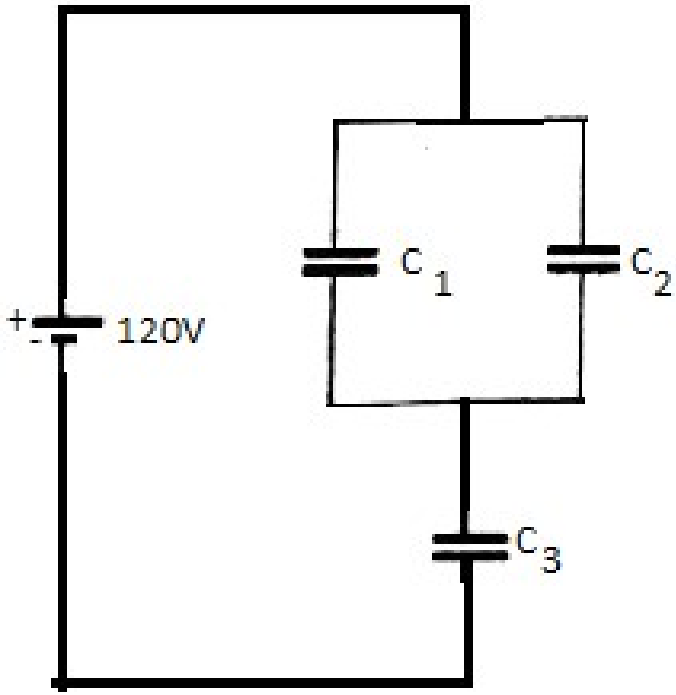
b) Charge on each capacitor of the network.



Numerical

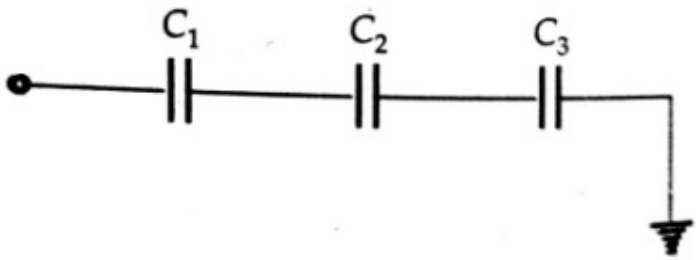
Question: In the figure $C_1 = 10\mu F, C_2 = 20\mu F, C_3 = 15\mu F$.

Find out the P.D across the capacitor



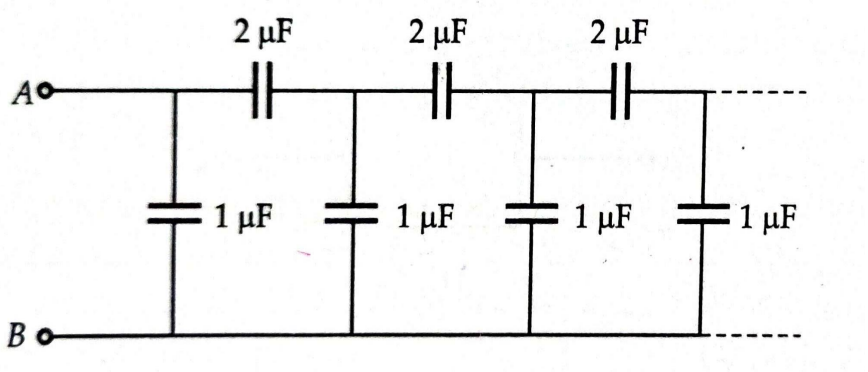
Numerical

Question: Given potential at A is 90V C_1. = 20μF C_2 = 30 μF C_3 = 15 μF the diagram. Find P.D between the plate C_2.



Numerical

Find the equivalent capacitor of the ladder between points A and B



HOME ASSIGNMENT

1. Three capacitors each of capacitance 9 pF are connected in series.

(a) What is the total capacitance of the combination?

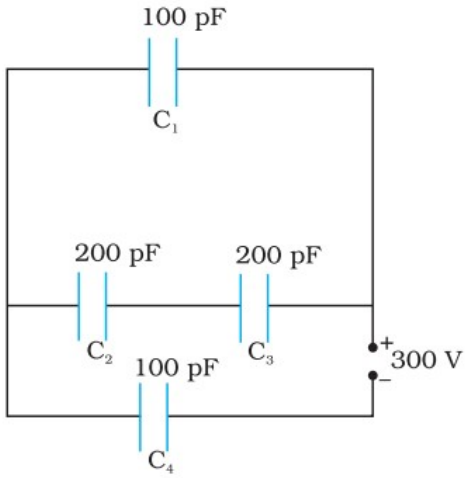
(b) What is the potential difference across each capacitor if the combination is connected to a 120 V supply?

2. Three capacitors of capacitances 2 pF, 3 pF and 4 pF are connected in parallel.

(a) What is the total capacitance of the combination?

(b) Determine the charge on each capacitor if the combination is connected to a 100 V supply.

3. Obtain the equivalent capacitance of the network in Fig. 2.35. For a 300 V supply, determine the charge and voltage across each capacitor.



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