Center for Academic Resources in Engineering (CARE) Peer Exam Review Session

PHYS 212 — University Physics: Electricity and Magnetism

Mid-semester Review Worksheet

The problems in this review are designed to help prepare you for your upcoming exam. Questions pertain to material covered in the course and are intended to reflect the topics likely to appear in the exam. Keep in mind that this worksheet was created by CARE tutors, and while it is thorough, it is not comprehensive. In addition to exam review sessions, CARE also hosts regularly scheduled tutoring hours.

Tutors are available to answer questions, review problems, and help you feel prepared for your exam during these times:

Session 1:

Can't make it to a session? Here's our schedule by course:

https://care.grainger.illinois.edu/tutoring/schedule-by-subject

Solutions will be available on our website after the last review session that we host.

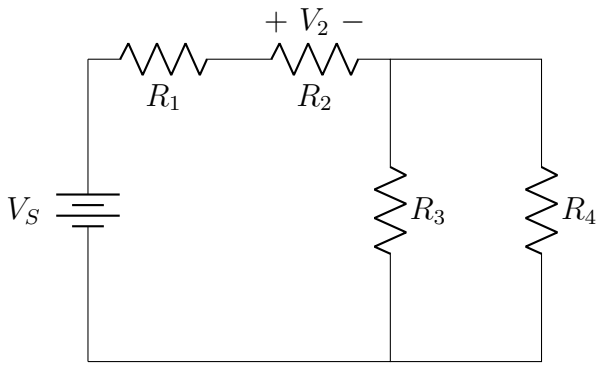
Step-by-step login for exam review session:

1. Log into Queue @ Illinois: https://queue.illinois.edu/q/queue/848
2. Click "New Question"
3. Add your NetID and Name
4. Press "Add to Queue"

Please be sure to follow the above steps to add yourself to the Queue.

Good luck with your exam!

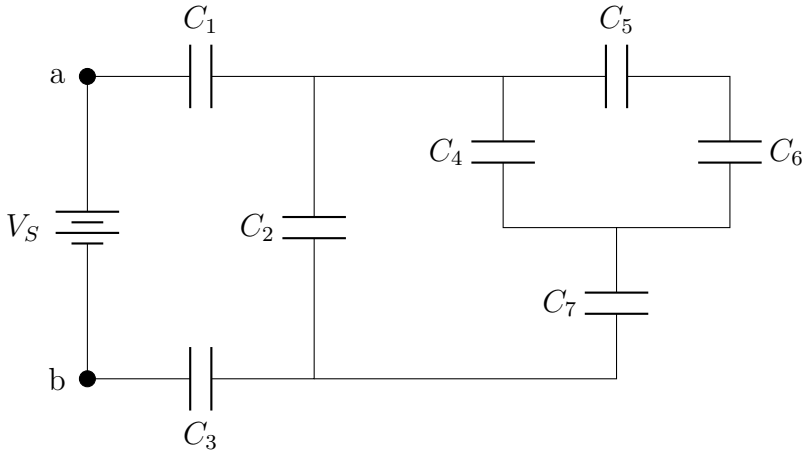
1. Consider the circuit below, where $V_S = 10$ V, $R_1 = 5\ \Omega$, and $R_3 = R_4 = 4\ \Omega$.



(i) If V_2 is 3 V, what is the resistance of R_2?

(ii) The cross-sectional area of R_3 is doubled and the length of R_1 is halved. What is the new value of V_2?

2. Question 2 refers to the circuit shown below where $C_1 = C_5 = C_6 = C_7 = 40\ \mu F$ and $C_2 = C_3 = C_4 = 20\ \mu F$:



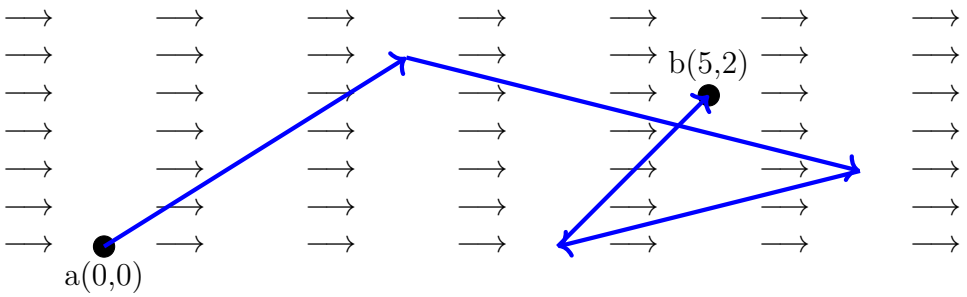
(i) Find the equivalent capacitance as seen by the voltage source.

(ii) An electron travels from node a to node b. What is its change in electric potential energy if $V_S = 5$ V?

(iii) What is the energy stored by the equivalent capacitance?

(iv) How does the energy stored in the equivalent capacitor change if we double the distance between each capacitor's plates?

3. Suppose you have a constant electric field of 2 V/m pointing to the right:



(i) What is the magnitude of the difference in electric potential between point a and point b? Assume the coordinate has a unit of meters.

(ii) If an electron is moved from point b to point a along the blue path labeled in the figure, what is its change in electric potential energy?

4. A 10 Ω cylindrical resistor of length 1 cm has a uniform electric field of 5 V/m inside it. What is the magnitude of the current through the resistor?