PHYS 102:General PhysicsII KOÇ UNIVERSITY Spring Semester 2016

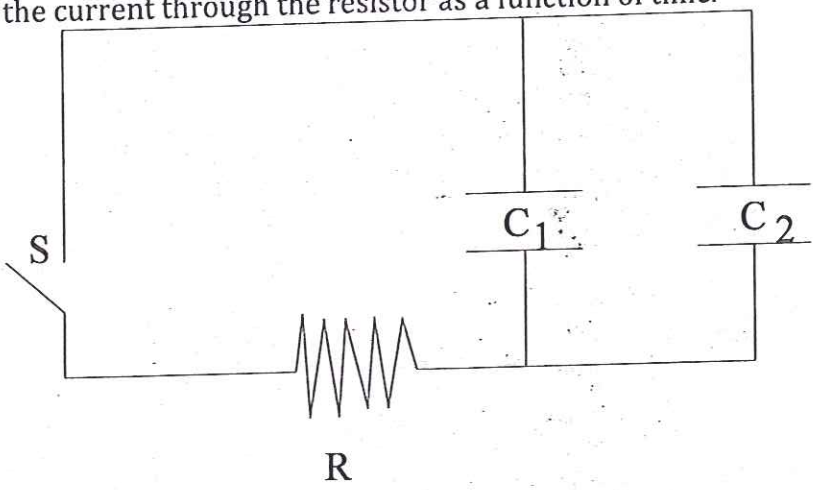
College of Sciences

Section 4 Quiz 5 17 March 2016

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

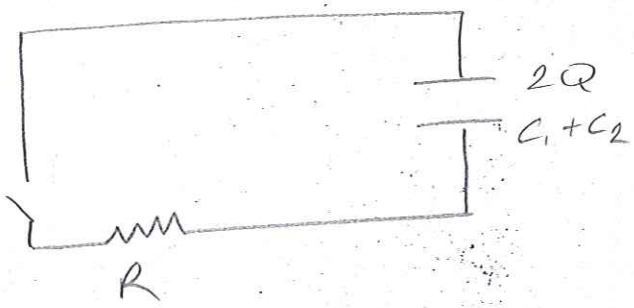
Name: SOLUTION KEY **Student ID:** **Signature:**

Both capacitors are initially charged with Q and the switch S is closed at time t = 0. Find the current through the resistor as a function of time.



Discharging capacitor: $Q(t) = Q e^{-t/\tau}$

$\tau = R C_{eq} = R(C_1 + C_2)$



$$I(t) = \frac{dQ}{dt} = -Q \frac{-1}{\tau} e^{-t/\tau}$$

$$I(t) = -2Q \frac{1}{R(C_1+C_2)} e^{-t/R(C_1+C_2)}$$

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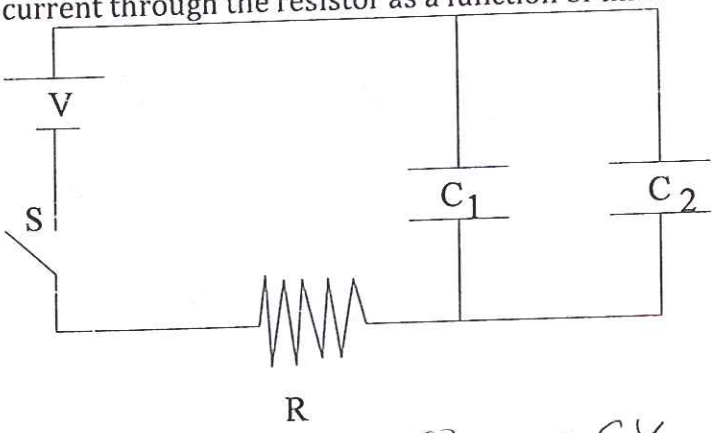
Section 1 Quiz 5 17 March 2016

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: SOLUTION KEY **Student ID:** **Signature:**

The capacitors are initially uncharged and the switch S is closed at time t = 0. Find the current through the resistor as a function of time.

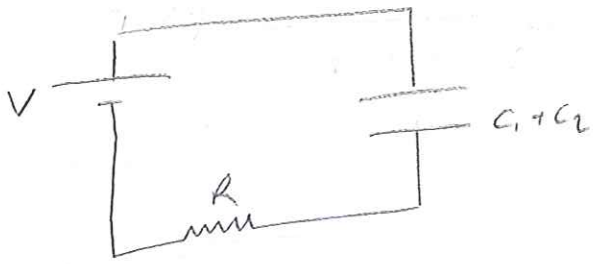


$Q_{max} = CV$

Charging capacitor: $Q(t) = Q_{max}(1 - e^{-t/\tau})$

$\tau = R(C_1 + C_2)$

$$I(t) = \frac{dQ}{dt} = Q_{max}\,\frac{1}{\tau}\,e^{-t/\tau}$$



$$I(t) = (C_1 + C_2)V\,\frac{1}{R(C_1 + C_2)}\,e^{-t/R(C_1 + C_2)}$$

PHYS 102:General PhysicsII **KOÇ UNIVERSITY** **Spring Semester 2016**

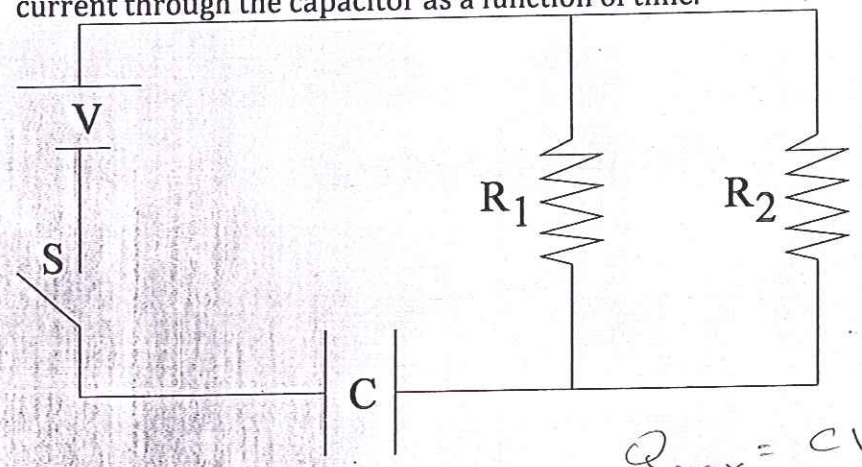
College of Sciences

Section 2 **Quiz 5** **17 March 2016**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: SOLUTION KEY **Student ID:** **Signature:**

The capacitor is initially uncharged and the switch S is closed at time t = 0. Find the current through the capacitor as a function of time.



$Q_{max} = CV$

Charging capacitor: $Q(t) = Q_{max}\left(1 - e^{-t/\tau}\right)$

$$\tau = \frac{R_1 R_2 C}{R_1 + R_2}$$

$$I(t) = \frac{dQ}{dt} = Q_{max}\frac{1}{\tau}e^{-t/\tau}$$

$$I(t) = CV\,\frac{R_1 + R_2}{R_1 R_2 C}\,e^{-t/\left(\frac{R_1 R_2 C}{R_1 + R_2}\right)}$$

PHYS 102:General PhysicsII **KOÇ UNIVERSITY** **Spring Semester 2016**

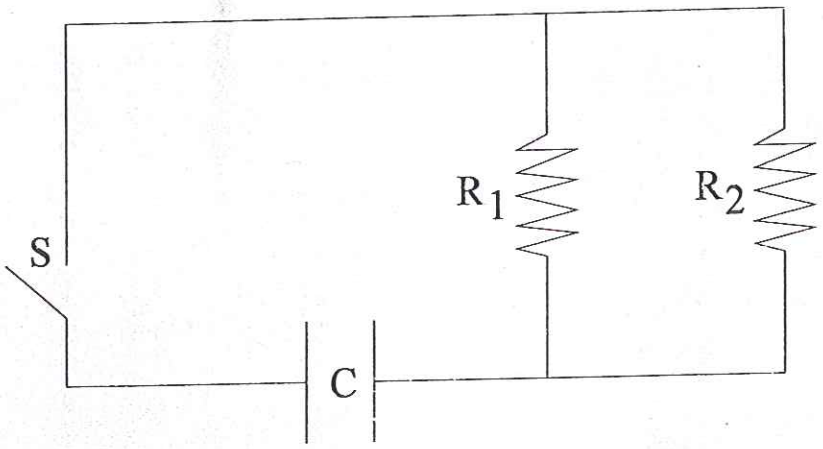
College of Sciences

Section 3 **Quiz 5** **17 March 2016**

Closed book. No calculators are to be used for this quiz.
Quiz duration: 10 minutes

Name: SOLUTION KEY **Student ID:** **Signature:**

The capacitor is initially charged with Q and the switch S is closed at time t = 0. Find the current through the capacitor as a function of time.



Discharging capacitor : $Q(t) = Q e^{-t/\tau}$

$\tau = R_{eq} C = \frac{R_1 R_2 C}{R_1 + R_2}$

$I(t) = \frac{dQ}{dt} = Q \frac{-1}{\tau} e^{-t/\tau}$

$I(t) = -Q\left(\frac{R_1 + R_2}{R_1 R_2 C}\right) e^{-t/\frac{R_1 R_2 C}{R_1 + R_2}}$