

# Physics 252 Examination 2

Friday, April 1, 2005

## Problem 1

A parallel plate capacitor (air filled) having an area of  $30\text{cm}^2$  and plate spacing  $1.5\text{mm}$  is charged to a potential difference of  $500\text{V}$ . Find

- (a) The capacitance
- (b) The magnitude of the charge on each plate
- (c) The stored energy
- (d) The electric field between the plates
- (e) The energy density between the plates

## Problem 2

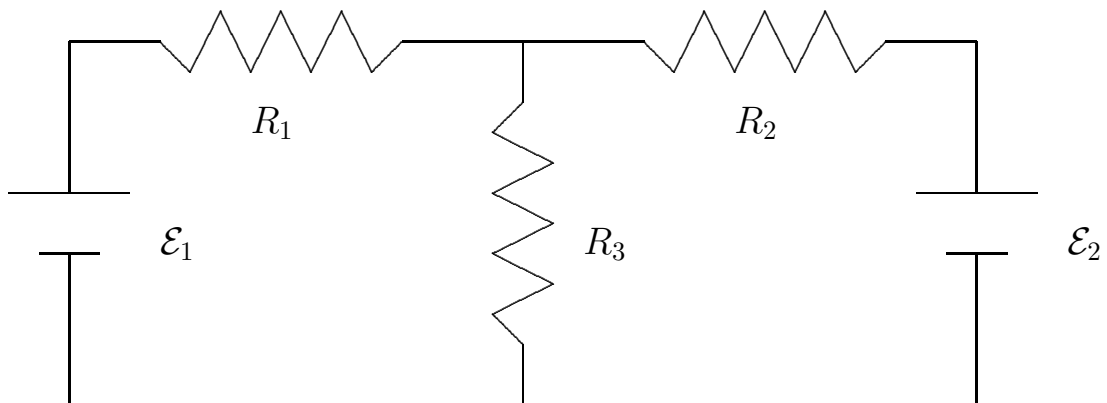


Figure 1: Circuit for Problem 2.  $\mathcal{E}_1 = 15\text{V}$ ,  $\mathcal{E}_2 = 7.5\text{V}$  and  $R = 5\Omega$ .

Figure ?? shows an electric circuit. What is the current in

- (a) Resistor  $R_1$
- (b) Resistor  $R_2$

## Problem 3

An electron with kinetic energy  $3\text{KeV}$  moving along the positive  $x$ -axis enters a region in which a uniform electric field of magnitude  $15\text{KV/m}$  is in the negative  $y$ -direction. A uniform magnetic field  $\vec{B}$  is to be set up in order to keep the electron moving on the  $x$ -axis and the direction of  $\vec{B}$  is chosen to minimize the required magnitude of  $\vec{B}$ . What is  $\vec{B}$  (in unit vector notation)?