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Module Title: Electrical & Electronic Principles

Module Code: ACDB4002

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Time: 12:47 pm

1 Exam

① a) $E = 100V$
 $I = 5 \times 10^{-3}A$

$$I = \frac{E}{R}$$
$$(5 \times 10^{-3}) = \frac{100}{R}$$
$$(5 \times 10^{-3})R = 100$$
$$R = \frac{100}{(5 \times 10^{-3})}$$
$$R = 20,000 \Omega$$

b) $E = 25V$
 $R = 20,000 \Omega$

$$I = \frac{E}{R}$$
$$I = \frac{25}{20,000}$$
$$I = 1.25 \times 10^{-3}A$$

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④

a) $P = E \times I$

$$P = 1000\text{w}$$

$$E = 240\text{V}$$

Rearranging

$$1000 = 240 \times I$$

$$I = \frac{1000}{240}$$

$$I = 4.17\text{A}$$

$\therefore$ A 5A fuse is most appropriate here

b) $P = 3000\text{w}$

$$E = 240\text{V}$$

$$3000 = 240 \times I$$

$$I = \frac{3000}{240}$$

$$I = 12.5\text{A}$$

$\therefore$ A 13A fuse is most appropriate here

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③

$$a) C = 4 \times 10^{-6} F$$

$$Q = 5 \times 10^{-3} C$$

$$E = ?$$

$$Q = CE$$

$$(5 \times 10^{-3}) = (4 \times 10^{-6}) E$$

$$E = \frac{(5 \times 10^{-3})}{(4 \times 10^{-6})}$$

$$E = 1250 V$$

$$b) C = 50 \times 10^{-9} F$$

$$E = 2000 V$$

$$Q = CE$$

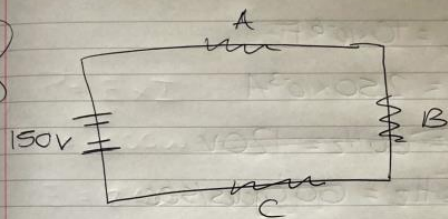
$$Q = (50 \times 10^{-9}) \times 2000$$

$$Q = 1 \times 10^{-4} C$$

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(4)

a)



Each lamp is ~~identical~~ identical and will therefore have the same resistance and voltage going through them.

Each lamp $\therefore$ has 50V across it.

b) If lamp C fails the overall resistance of the circuit will lower. Causing lamp A and B to have a higher voltage, of 75V. The current will not change as in a series circuit ~~the~~ all lamps are in equal current.

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$$\textcircled{5} C = 10 \times 10^{-6} \text{ F}$$

$$I = 250 \times 10^{-3} \text{ A}$$

$$E = 60 \text{ Hz} = 120 \text{ V}$$

$$60 \text{ Hz} = 60 \text{ cycles/sec}$$

$$60 \text{ Hz} = \underline{0.0167 \text{ s}}$$

$$Q = It$$

$$Q = (250 \times 10^{-3}) \times 0.0167$$

$$Q = \underline{4.175 \times 10^{-3} \text{ C}}$$

$$Q = CE$$

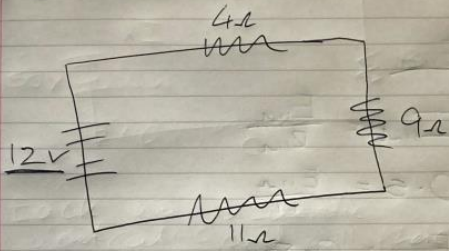
$$(4.175 \times 10^{-3}) = (10 \times 10^{-6}) \times E$$

$$E = \frac{(4.175 \times 10^{-3})}{(10 \times 10^{-6})}$$

$$E = \underline{417.5 \text{ V}}$$

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$$\textcircled{6} E = 12V$$



$$R_T = 4 + 9 + 11 = \underline{24\Omega}$$

$$I_T = \frac{E_T}{R_T}$$

$$I_T = \frac{12}{24}$$

$$I_T = \underline{0.5A}$$

$$\text{Series circuit} \therefore I_{9\Omega} = \underline{0.5A}$$

$$E_{9\Omega} = I_{9\Omega} = \frac{E_{9\Omega}}{R_{9\Omega}}$$

$$0.5 = \frac{E_{9\Omega}}{9}$$

$$E_{9\Omega} = 0.5 \times 9$$

$$E_{9\Omega} = \underline{4.5V}$$

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$$P_{112} = I_{112} \times E_{112}$$

$$E_{112}$$

$$I_{112} = \frac{E_{112}}{R_{112}}$$

$$0.5 = \frac{E_{112}}{11}$$

$$E_{112} = 0.5 \times 11$$

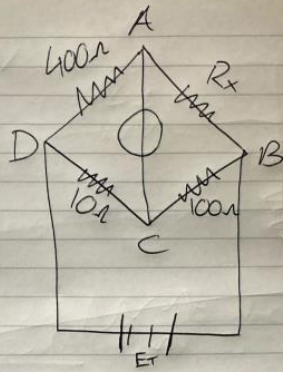
$$E_{112} = 5.5V$$

$$P_{112} = 0.5 \times 5.5$$

$$P_{112} = 2.75W$$

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⑦



$$(R_x) \times 10 = 100 \times 400$$

$$10R_x = 40,000$$

$$R_x = \frac{40,000}{10}$$

$$R_x = 4000\Omega$$