


Example Exam - Basic Electricity, 08/10/2018

Name: 

Student ID:

0	0	0		0	0	0	0
1	1	1	1	1	1	1	
2	2	2	2		2	2	2
3	3	3	3	3	3	3	3
		4	4	4	4	4	4
5	5	5	5	5		5	5
6	6	6	6	6	6		6
7	7		7	7	7	7	7
8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9

In the following circuit, where source voltage is $V_s = 110\text{ V}$, current and active power measurements were taken:

- $I_2 = 2\text{ A}$;
- $I_3 = 4\text{ A}$;
- $P_3 = 300\text{ W}$ (measured in RL branch)

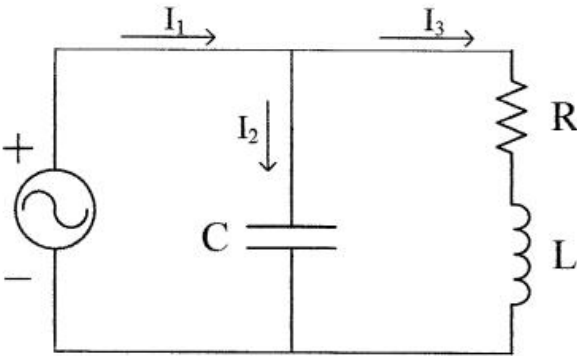


Figura 2: Circuit



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Question 1 Find the magnitude for current I_1 , in amperes.

<input checked="" type="checkbox"/>	0	0	0
<input type="checkbox"/>	1	1	1
<input checked="" type="checkbox"/>	2	2	2
<input type="checkbox"/>	3	3	3
<input type="checkbox"/>	4	4	4
<input type="checkbox"/>	5	5	5
<input type="checkbox"/>	6	6	6
<input type="checkbox"/>	7	7	7
<input type="checkbox"/>	8	8	<input checked="" type="checkbox"/>
<input type="checkbox"/>	9	9	<input type="checkbox"/>

$$I_3 P_3 = R |I_3|^2 \rightarrow 300 = R \cdot 4^2 \rightarrow R = 18,75 \Omega$$

$$|\bar{Z}_{RL}| = \sqrt{R^2 + X^2} = \frac{|V_s|}{|I_3|} \rightarrow \sqrt{18,75^2 + X^2} = \frac{110}{4} \rightarrow X = 20,12 \Omega$$

$$I_3 \bar{V}_s = 110 \angle 0^\circ, I_3 = \frac{110}{18,75 + j20,12} = 4,00 \angle -47^\circ \text{ A}$$

$$I_2 = 2,00 \angle 90^\circ \text{ A}, I_1 = I_2 + I_3 = 2,88 \angle -18,8^\circ \text{ A}$$

2/2

Question 2 Find the power factor in the RL branch (leading or lagging).

<input checked="" type="checkbox"/>	0	0
<input type="checkbox"/>	1	1
<input type="checkbox"/>	2	2
<input type="checkbox"/>	3	<input checked="" type="checkbox"/>
<input type="checkbox"/>	4	4
<input type="checkbox"/>	5	5
<input checked="" type="checkbox"/>	6	6
<input checked="" type="checkbox"/>	7	7
<input type="checkbox"/>	8	<input checked="" type="checkbox"/>
<input type="checkbox"/>	9	9

$$p.f. = \cos 47,0^\circ = 0,73$$

0/2

Question 3 Find the reactive power supplied by the voltage source, in VAR.

<input type="checkbox"/>	<input checked="" type="checkbox"/>	0	0	0
<input checked="" type="checkbox"/>	1	<input checked="" type="checkbox"/>	1	1
<input type="checkbox"/>	2	2	2	<input checked="" type="checkbox"/>
<input type="checkbox"/>	3	3	3	3
<input type="checkbox"/>	4	4	4	4
<input type="checkbox"/>	5	5	5	5
<input type="checkbox"/>	6	6	6	6
<input type="checkbox"/>	7	7	7	<input checked="" type="checkbox"/>
<input type="checkbox"/>	8	8	<input checked="" type="checkbox"/>	8
<input type="checkbox"/>	9	9	<input checked="" type="checkbox"/>	9

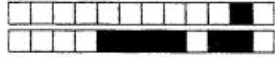
$$Q = Q_L + Q_C$$

$$Q_L = |I_3|^2 X = 4^2 \cdot 20,12 = 321,92 \text{ VAR}$$

$$Q_C = -110 \cdot 2 = -220 \text{ VAR}$$

$$Q = 101,92 \text{ VAR}$$

3/3



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Question 4 Describe the procedure and assumptions that should be followed to find the capacitor that adjusts the power factor to a specific value.

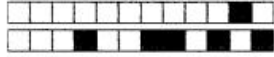
☐ 0 ☐ 0.5 ☐ 1 ☐ 1.5 ☒ 2 ☐ 2.5 ☐ 3

2/3

Dorem ipsum dolor

1. Sit amet
2. Consectetur adipiscing elit
3. Sed do eiusmod

Tempor incididunt ut labore et dolore magna aliqua



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