

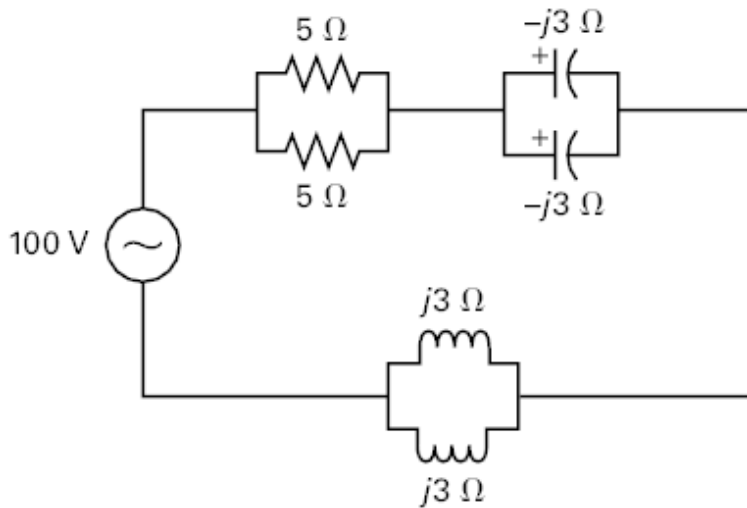
[← Return to Questions \(/admin/questions/0?sfield=magento\\_id&stext=59353&sdka=&stype=&sdiff=\)](#)

# Test Bank

## Question preview

### Question

What is most nearly the power dissipated by the circuit shown?



### Answers

(A) 50 W

(B) 400 W

(C) ~~800 W~~ Replace 800 with: 900

(D) ~~900 W~~ Replace 900 with: 4000

The answer is (D).

### Solution

Combine the parallel resistors.

$$\begin{aligned}
 Z_R &= \frac{Z_{5\Omega} Z_{5\Omega}}{Z_{5\Omega} + Z_{5\Omega}} \\
 &= \frac{(5\Omega \angle 0^\circ)(5\Omega \angle 0^\circ)}{5\Omega \angle 0^\circ + 5\Omega \angle 0^\circ} \\
 &= 2.5\Omega \angle 0^\circ
 \end{aligned}$$

Replace with Insert a file named:  
0000059353\_EPRP3\_2  
862\_insert.docx

Combine the parallel capacitors.

### QUESTION DATA

**Vendor**

0000059353

**Solving Time**

**Difficulty**

easy

**Quantitative?**

No

**Status**

Active

**Created On**

02/13/2018 05:17:49

PM

**Published On**

02/13/2018 05:17:49

PM

**Modified On**

09/16/2019 05:08:31

PM

OTHER VERSIONS

DISCIPLINES

KNOWLEDGE AREAS

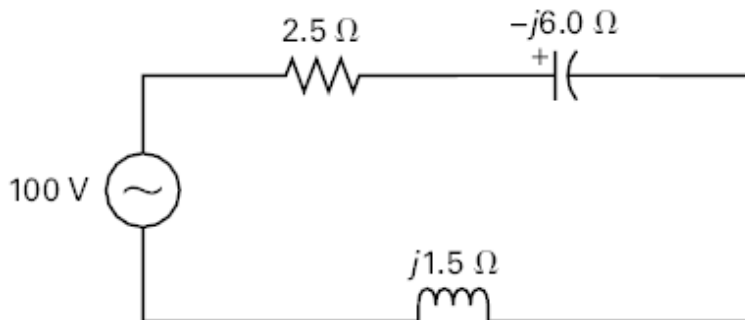
PRODUCTS USED IN

$$\begin{aligned} \mathbf{Z}_C &= \mathbf{Z}_{3\Omega} + \mathbf{Z}_{3\Omega} \\ &= -j3\Omega - j3\Omega \\ &= -j6\Omega \end{aligned}$$

Combine the parallel inductors.

$$\begin{aligned} \mathbf{Z}_L &= \frac{\mathbf{Z}_{3\Omega} \mathbf{Z}_{3\Omega}}{\mathbf{Z}_{3\Omega} + \mathbf{Z}_{3\Omega}} \\ &= \frac{(j3\Omega)(j3\Omega)}{j3\Omega + j3\Omega} \\ &= j1.5\Omega \end{aligned}$$

The circuit can then be reduced to the equivalent circuit shown.



Calculate the total impedance of the circuit.

$$\begin{aligned} \mathbf{Z}_t &= \mathbf{Z}_R + \mathbf{Z}_C + \mathbf{Z}_L \\ &= 2.5\Omega \angle 0^\circ - j6\Omega + j1.5\Omega \\ &= 2.5\Omega \angle 0^\circ - j4.5\Omega \\ &= 5.15\Omega \angle - \end{aligned}$$

From Ohm's law, Eq. 27.41, the total current in the

$$\begin{aligned} \mathbf{V} &= \mathbf{I}\mathbf{Z} \\ \mathbf{I} &= \frac{\mathbf{V}}{\mathbf{Z}} \\ &= \frac{100\text{ V} \angle 0^\circ}{5.15\Omega \angle -61^\circ} \\ &= 19.42\text{ A} \angle 61^\circ \end{aligned}$$

Replace with insert  
B in file named:  
0000059353\_EPRP  
3\_2862\_insert.docx

Calculate the power dissipated in the resistor only. From Eq. 29.6, the dissipated power is

$$\begin{aligned} P &= I^2 R \\ &= (19.42\text{ A})^2 (2.5\Omega) \\ &= 942.84\text{ W} \end{aligned}$$

Replace with insert C  
in file named:  
0000059353\_EPRP3\_  
2862\_insert.docx