EE205 Two-Ports Networks

Properties and Analysis

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Reciprocal Two-Port Circuits

- A two-port circuit is reciprocal if the interchange of an ideal voltage source at one port with an ideal ammeter at the other port produces the same ammeter reading.

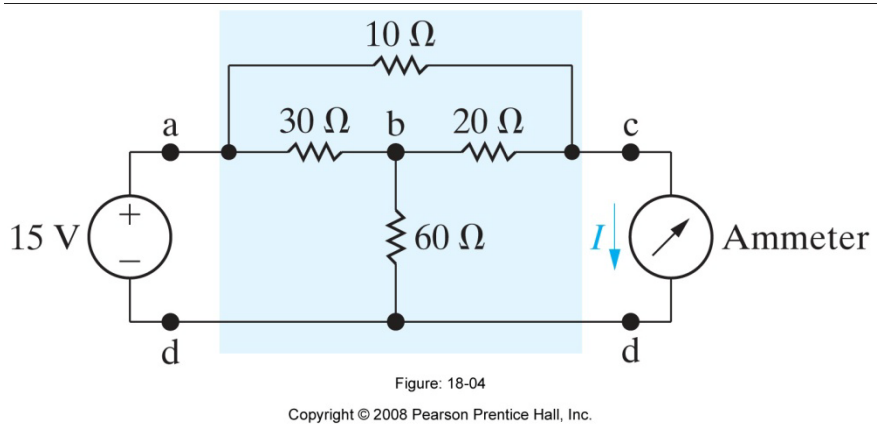

Figure: 18-04

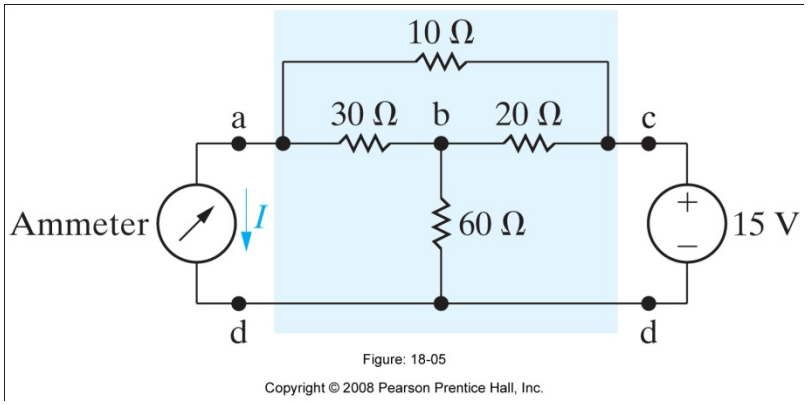

Figure: 18-05

I=1.75 A

Cont… Reciprocal Networks

- A two-port circuit is also reciprocal if the interchange of an ideal current source at one port with an ideal voltmeter at the other port produces the same voltmeter reading.
- Only three calculations or measurements can be made to determine the parameters.
- For a reciprocal network, the following is true:

$z_{12}=z_{21}$

$y_{12}=y_{21}$

$\Delta a=1$

$\Delta b=1$

$h_{12}=-h_{21}$

$g_{12}=-g_{21}$

Symmetric Networks

- A reciprocal two-port circuit is symmetric if its ports can be interchanged without disturbing the values of the terminal currents and voltages.
- For symmetric networks, the following *additional* features are true:

$z_{11}=z_{22}$

$y_{11}=y_{22}$

$a_{11}=a_{22}$

$b_{11}=b_{22}$

$\Delta h=1$

$\Delta g=1$

- Only two measurements or calculations are required.

Symmetric two port networks: (a) Tee (b) pi (c) bridged tee (d) lattice

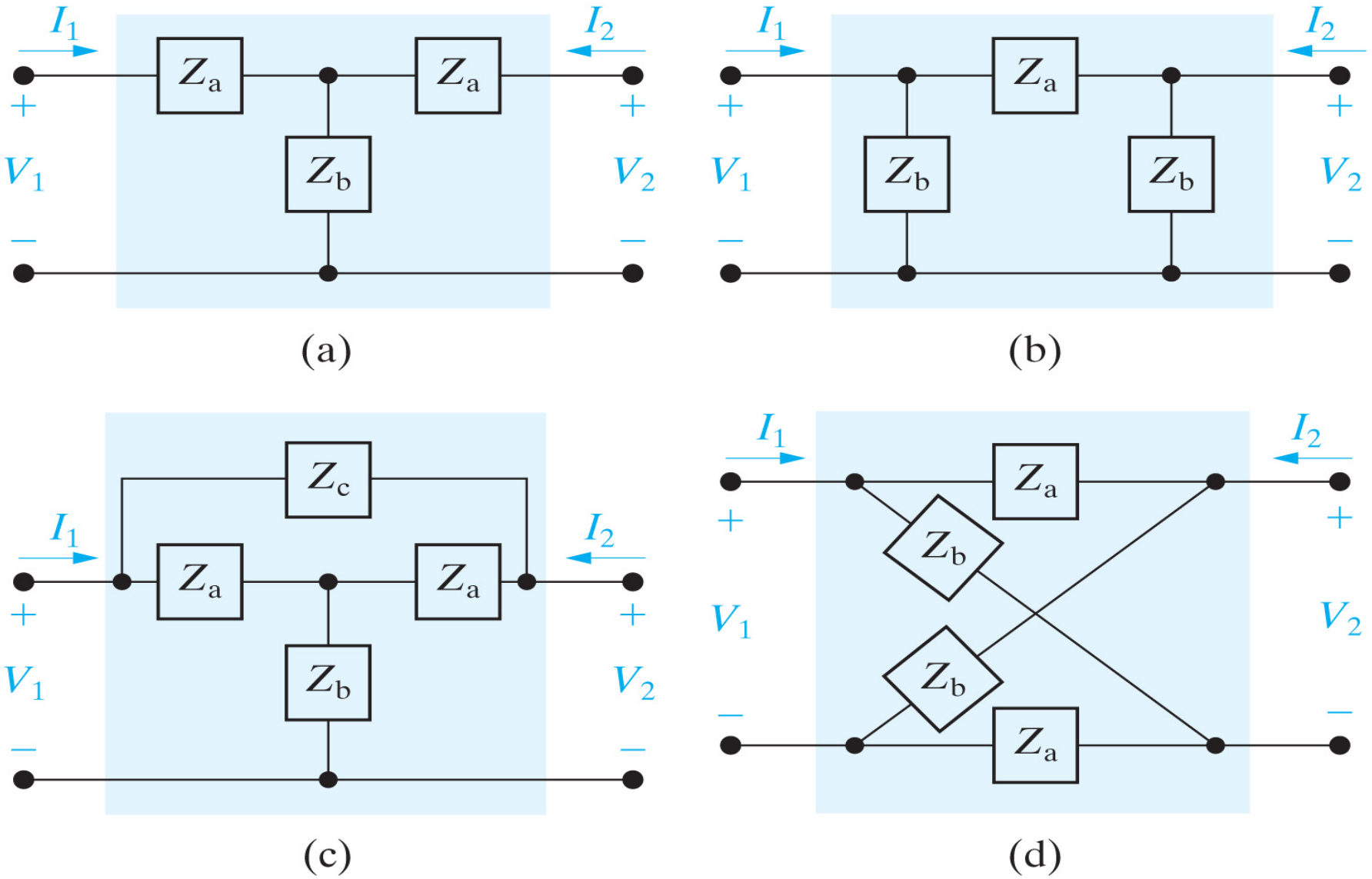

Figure: 18-06a-d

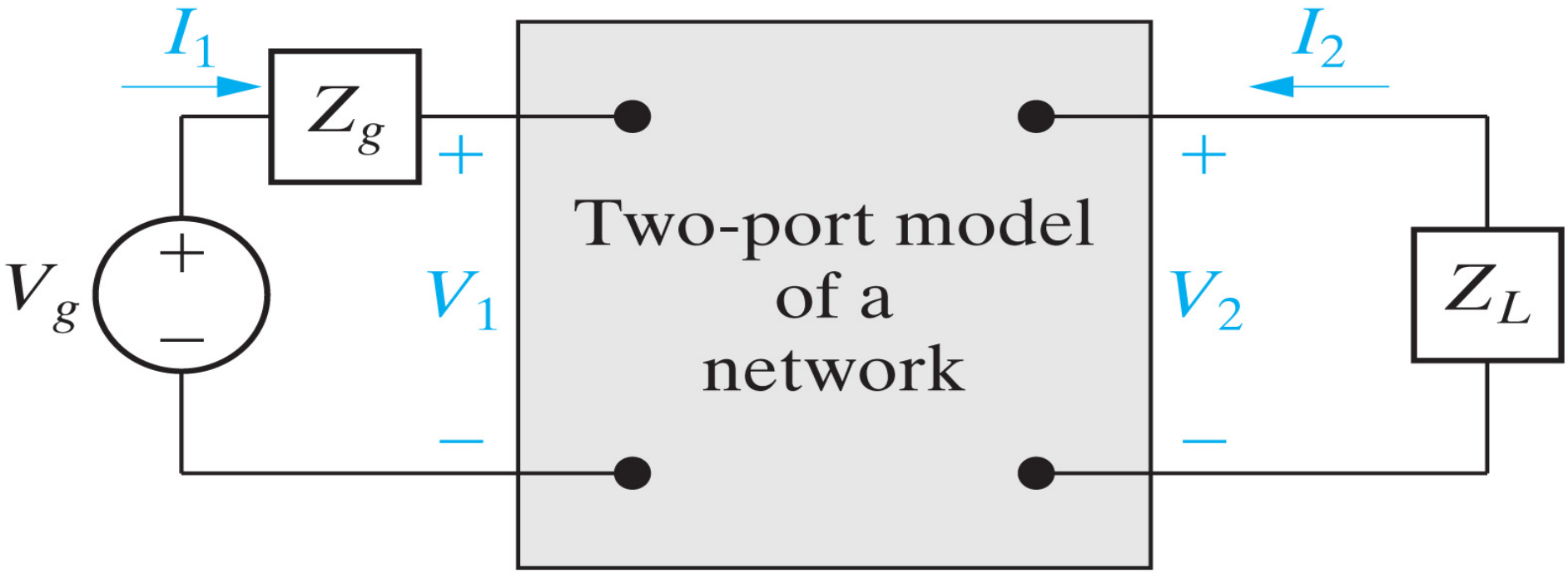

Figure: 18-07

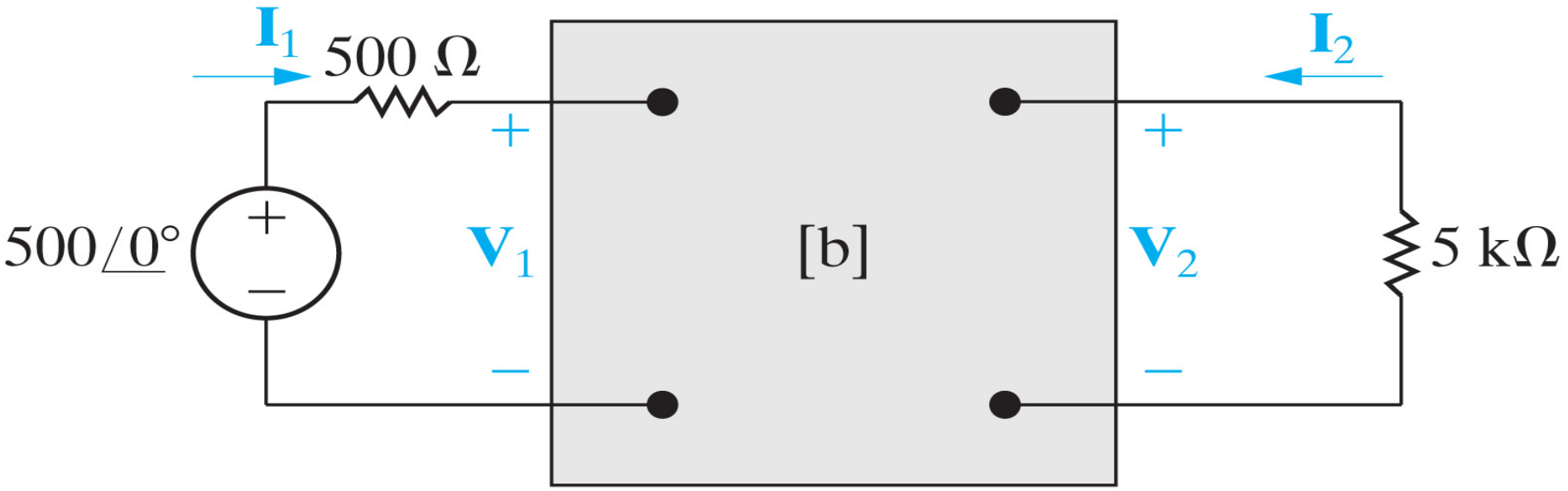

Figure: 18-08Ex18.4