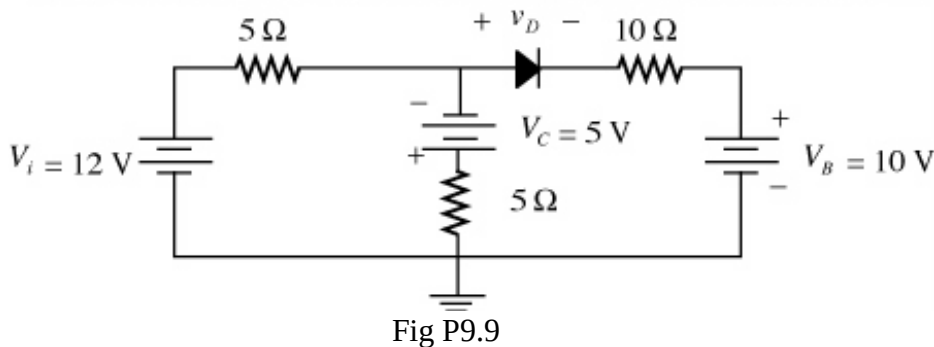


Q1 Problem 9.10, 9.11 and 9.12

Fig 9.9 shows the same circuit analyzed in Ideal diode model example 3 of the lecture slides. Determine whether the diode is conducting or not when the following changes are made:

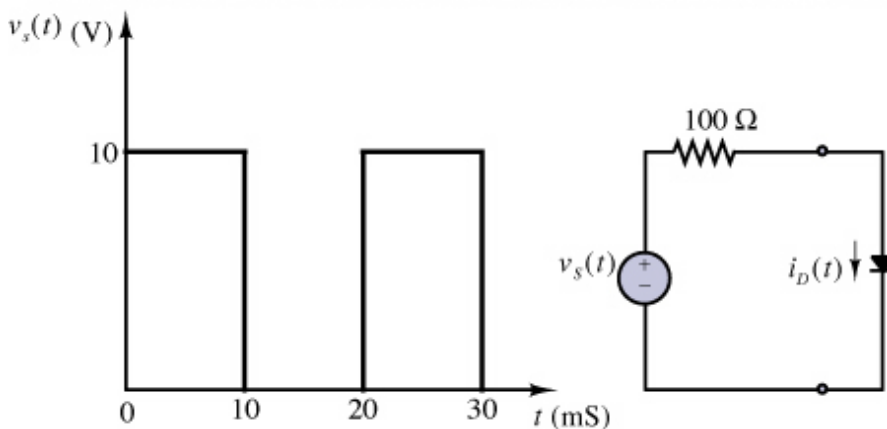
- $V_B = 15V$
- $V_C = 15V$
- $V_C = 10V, V_B = 15V$

**Q2 Problem 9.13**

Given that the voltage source follows a pulse as shown in Fig P9.13, sketch the diode current if:

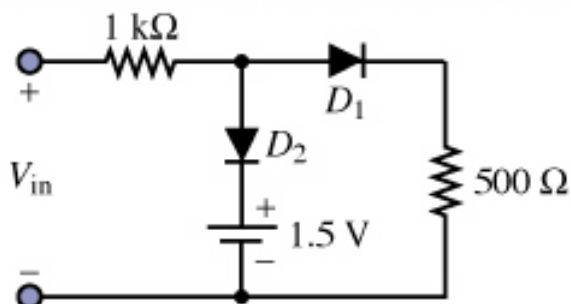
- The diode is treated as ideal
- The diode is assumed to have an offset voltage of 0.6V

Find the power dissipated in the diode when it is conducting (just for the offset model case).

**Q3 Problem 9.22**

Find the range of V_{in} for which diode D_1 is forward biased. Assume ideal diodes.

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Q4 Problem 9.24

Assuming ideal diodes and $v_s(t) = 10\sin(2000\pi t)$,

(a) Sketch $v_o(t)$ against time axis, (b) Sketch v_o against v_s

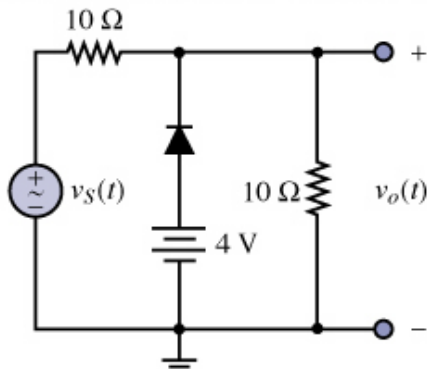


Fig P9.24

Q5 Problem 9.25

Repeat Q4 using the offset diode model with $V_\gamma = 0.6V$

Q6 Problem 9.38

The diodes in the full-wave power supply have a rated peak reverse voltage of 25V and are fabricated from silicon ($V_\gamma = 0.7V$). Given that: Turns ratio $n = 0.05883$

$C = 80 \mu F$, $R_L = 1 k\Omega$, $V_{line} = 170\cos(\omega t) V$

- Determine the actual peak reverse voltage across each diode
- Explain why these diodes are or are not suitable for the specifications given

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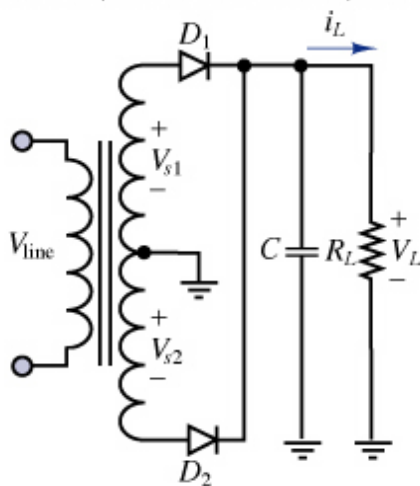


Fig P9.38

Numerical answers

Q1 Problem P9.10, 9.11, 9.12

- (a) Off
 (b) Off
 (c) Off

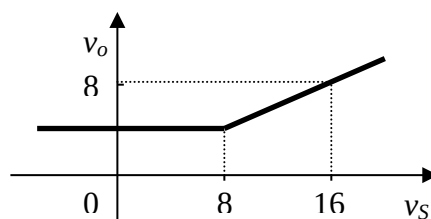
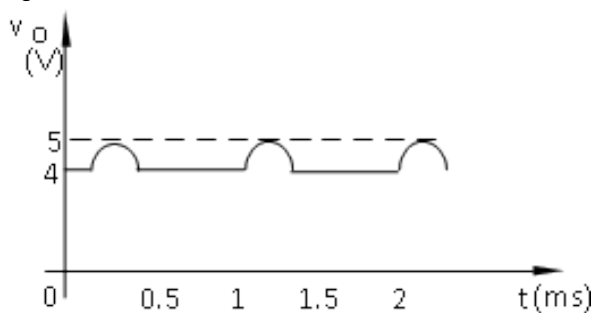
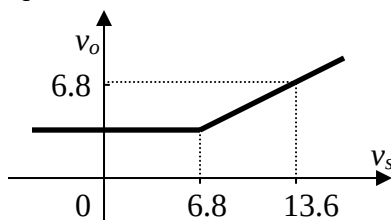
Q2 Problem 9.13

- (a) 100mA ($t < 10\text{ms}$), 0mA ($10 < t < 20\text{ms}$), 100mA ($20 < t < 30\text{ms}$)
 (b) 94mA ($t < 10\text{ms}$), 0mA ($10 < t < 20\text{ms}$), 94mA ($20 < t < 30\text{ms}$)

$$\text{Power} = 0.6 \times 94 = 56.4\text{mW}$$

Q3 Problem 9.22

D_1 is forward-biased for any $V_{in} > 0$

Q4 Problem 9.24**Q5 Problem 9.25****Q6 Problem 9.38**

Peak reverse voltage is seen across one of the diodes when V_{s1} reaches a peak.

E.g. at $\omega t = \pi$, reverse voltage = 19.3V

Hint: $V_{s1} = 10\text{V}$ (peak value)

Hence maximum peak reverse voltage is 19.3V. This is less than the rated value of 25V, so the diodes are suitable.