

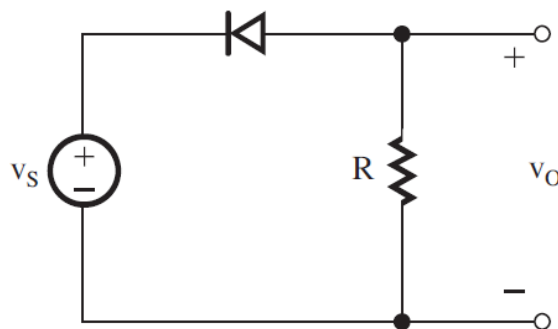
REVIEW QUESTIONS

1. Write short notes about the following items with the aid of formulas and sketches:
 - a. Half wave rectifier
 - b. Full wave rectifier (Center tapped - Bridge)
 - c. Apply average value integration on half wave rectifier
 - d. Apply average value integration on full wave rectifier
 - e. Effect of the Turns Ratio on the Output Voltage

PPROBLEMS

3.1 Consider the half-wave rectifier circuit of Fig. 3.1 with the diode reversed. Let v_S be a sinusoid with 10 V peak amplitude, and let $R = 1$ kohms. Use the constant-voltage-drop diode model with $V_D = 0.7$ V.

- (a) Sketch the transfer characteristic. (b) Sketch the waveform of v_O .
- (c) Find the average value of v_O . (d) Find the peak current in the diode.
- (e) Find the PIV (Peak inverse voltage) of the diode.



Q3.2 A half-wave rectifier circuit with a 1-kohm load operates from a 120-V (rms) 60-Hz household supply through a 12-to-1 step-down transformer. It uses a silicon diode that can be modeled to have a 0.7-V drop for any current. What is the peak voltage of the rectified output? For what fraction of the cycle does the diode conduct? What is the average output voltage? What is the average current in the load?

Q3.3 A full-wave rectifier circuit with a 1-kohms load operates from a 120-V (rms) 60-Hz household supply through a 6-to-1 transformer having a center-tapped secondary winding. It uses two silicon diodes that can be modeled to have a 0.7-V drop for all currents. What is the peak voltage of the rectified output? For what fraction of a cycle does each diode conduct? What is the average output voltage? What is the average current in the load?

Q3.4 A full-wave bridge-rectifier circuit with a 1-kohm load operates from a 120-V (rms) 60-Hz household supply through a 12-to-1 step-down transformer having a single secondary winding. It uses four diodes, each of which can be modeled to have a 0.7-V drop for any current. What is the peak value of the rectified voltage across the load? For what fraction of a cycle does each diode conduct? What is the average voltage across the load? What is the average current through the load?

Q3.5 Augment the rectifier circuit of Problem 3.2 with a capacitor chosen to provide a peak-to-peak ripple voltage of (i) 10% of the peak output and (ii) 1% of the peak output. In

each case:

- (a) What average output voltage results?
- (b) What fraction of the cycle does the diode conduct?
- (c) What is the average diode current?
- (d) What is the peak diode current?

Q3.6 Repeat Problem 3.5 for the rectifier in Problem 3.3.

Q3.7 Repeat Problem 3.5 for the rectifier in Problem 34.

LAB

L3.1 In electronic devices and circuits lab, perform the following experiments:

- a. Draw diode characteristics and practical study
- b. Half wave circuit practical study
- c. Full wave circuit practical study (Center tapped – Bridge)

PRACTICAL

P3.1 Design and implement on a test board a complete power supply circuit with the following specifications

Input voltage	Mains 220 V AC
Output voltage	12 V DC
Load	5 W
Ripple voltage	<5%
Indicator led	True
Output connection	Terminal block

Test your circuit using AVO-meter and Oscilloscope.