Department of ECE, Bennett University

EECE105L: Fundamentals of Electrical and Electronics Engineering

Tutorial Sheet-13

Topics Covered: Applications of Diodes

If not mentioned, assume non-ideality factor (η) as 1.5, reverse saturation current I_0 as 5 nA, built-in the voltage of the diode is 0.6 V

Half wave rectification:

1. Assume a sinusoidal waveform with an amplitude of 10 V and 60 Hz is applied to the circuit shown in fig. 1. Draw the output waveform across the resistor and diode by assuming the diode is (i) ideal (ii) non-ideal.

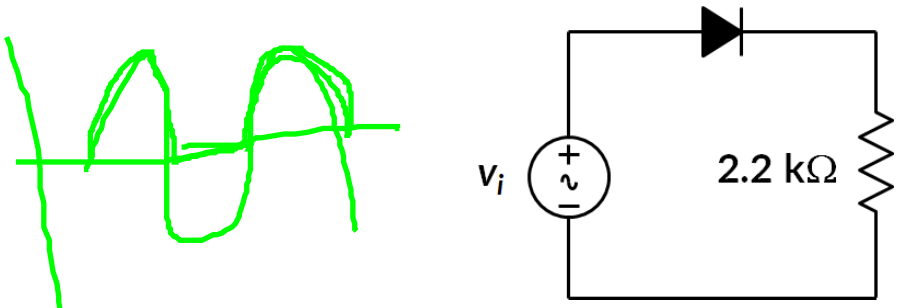

Fig. 1

2. Assume a sinusoidal waveform with an amplitude of 10 V and 60 Hz is applied to the circuit shown in fig. 2. Draw the output waveform across the resistor and diode by assuming the diode is (i) ideal (ii) non-ideal.

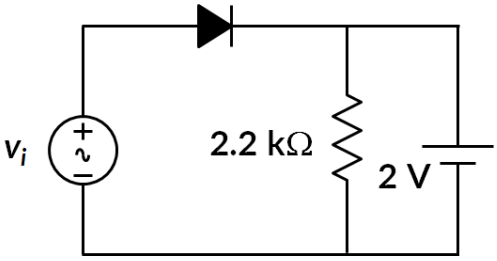

Fig. 2

Full wave rectification:

3. A full-wave bridge rectifier with a 120 V RMS sinusoidal input has a load resistance of 1 kΩ. Answer the following:

   i) What is the voltage available across the load?

   ii) What is the peak inverse voltage of each diode?

   iii) When the diodes are conducting, what is the maximum current through each diode?

iv) What should be the minimum power rating of the diode?

4. A full-wave bridge rectifier with a 200 V peak-to-peak input has a load resistance of 3.3 kΩ. Draw the output voltage waveform as seen across the load.

Clippers and Clampers

5. For the inputs shown in the circuit shown in Fig. 3 and Fig. 4, draw the output voltage across the load resistor R_L.

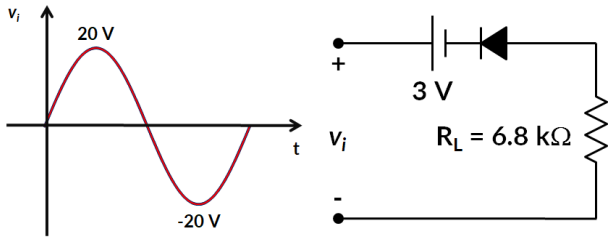

Fig. 3

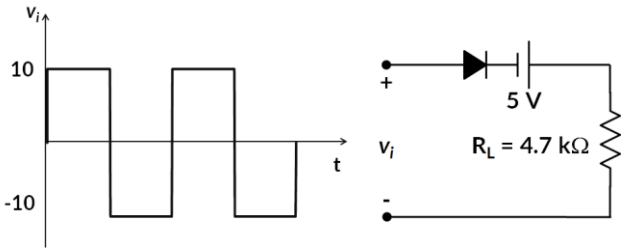

Fig. 4

6. Consider the circuit shown in fig. 5. Determine the current through the resistor and voltage across the diode. Assume that the cut-in voltage of the diode is 0.6 V.

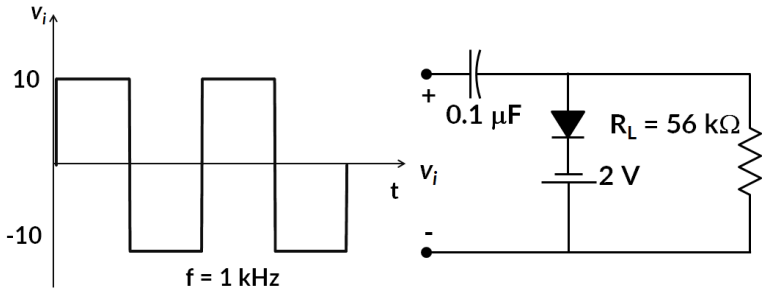

Fig. 5

Answers: will be discussed in tutorial sessions

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