MEE210 ELECTRICAL MACHINES – Experiment #2

LABORATORY CONTENT: AC to DC conversion (Rectification)

EQUIPMENT REQUIRED: (students should bring electronic components)

Qty	Description
1	Signal generator(will be ready at lab.)
1	Oscilloscope(will be ready at lab.)
1	Breadboard
4	1N4001 diode
1	10k resistor
1	1µF capacitor
1	10µF capacitor
-	Wiring equipments (jumper cables, crocodiles, etc.)

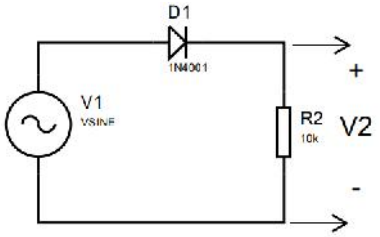
PRELIMINARY QUESTIONS:

1) Briefly explain the how a rectifier works in AC to DC conversion (4 sentences at max).

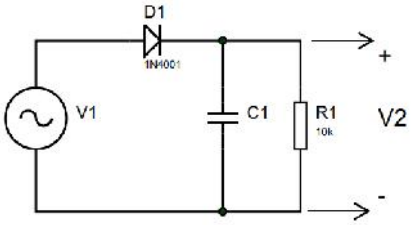
2) Simulate the output voltage signals for the given six circuits. Assume that $V_1=5sin(2\pi 50t)$. Give the signal forms for at least two periods. (R=10k for each, C = 1µF and 10µF)

EXERCISE STEPS:

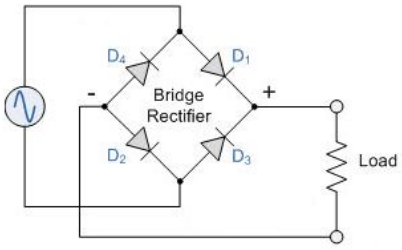
1) Apply the circuits below. Assume that $V_1=5sin(2\pi 50t)$. Find the peak, average and RMS values of the output voltage signal.



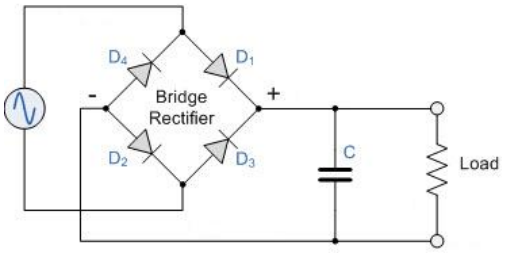
Half bridge rectifier



Half bridge rectifier with capacitor



Full bridge rectifier



Full bridge rectifier with capacitor

	Peak value of output voltage (V)	Average value of output voltage (V)	RMS value of output voltage (V)
Half bridge, no capacitor			
Half bridge, C=1µF			
Half bridge, C=10µF			
Full bridge, no capacitor			
Full bridge, C=1µF			
Full bridge, C=10µF			

POSTLIMINARY QUESTIONS:

1) Give two other filter types for filtering output (a basic schematic and advantages in two sentences at max).

2) Search for the equations and calculate the terms for full bridge rectifier (without capacitor). Give a one-sentence explanation for terms typed in *italic* font.

- Peak current
- Output current
- DC output voltage
- Root Mean Square (RMS) value of current
- Root Mean Square (RMS) value of output voltage
- *Rectification efficiency*
- *Ripple factor*
- *Regulation*

IMPORTANT NOTE: For the next experiment, you need to build up an electromagnet and magnetic field measuring unit. So, the ones who are not prepared for the experiment will not be allowed to participate.