University of Jordan
School of Engineering
Electrical Engineering Department

10/10

EE 204
Electrical Engineering Lab

EXPERIMENT 8 REPORT & PRE-LAB
DIODE APPLICATIONS

Section # _____ Group # _____

	Student Name	ID
1.	Lamees Mahmoud Salahat.	0154007.
2.		
3.		
4.		

EXPERIMENT 8
DIODE APPLICATIONS

PROCEDURE A – MULTIMETER DIODE TESTING

2. First, conduct the *forward bias* test, where the red multimeter lead (+ve) is connected to the anode terminal of the diode (+ve), and the black multimeter lead (COM) is connected to the cathode terminal of the diode (-ve). What is the reading on the multimeter screen?

0.5542 V

3. What does the above multimeter reading mean?

The voltage of the diode in forward baised

4. Second, conduct the *reverse bias* test, where the red multimeter lead (+ve) is connected to the cathode terminal of the diode (-ve), and the black multimeter lead (COM) is connected to the anode terminal of the diode (+ve). What is the reading on the multimeter screen?

-OL-

5. What does the above multimeter reading mean?

The voltage of the diode in reversed baised

PROCEDURE B – DIODE V-I CURVE

Table 1

V_S (V)	0.1	0.3	0.6	0.7	0.8	1	1.3	1.8	4.2	6.3
I_D (mA)	0	0	0.8	1.3	1.7	4	6.5	10.8	33.9	54.9
V_D (V)	0.161	0.298	0.597	0.621	0.635	0.672	0.693	0.715	0.76	0.778

Table 2

V_S (V)	0.3	0.7	1	1.8	4.2	6.3
I_D (mA)	0	0	0	0	0	0
V_D (V)	-0.301	-0.71	-0.997	-1.82	-4.28	-6.37

10. Using the *measured* values in Tables 1 and 2, plot (**by hand**) the following figure using the graph paper attached at the end of the report: I_D on the y-axis versus V_D on the x-axis for both the forward bias and reverse bias regions on the same figure.

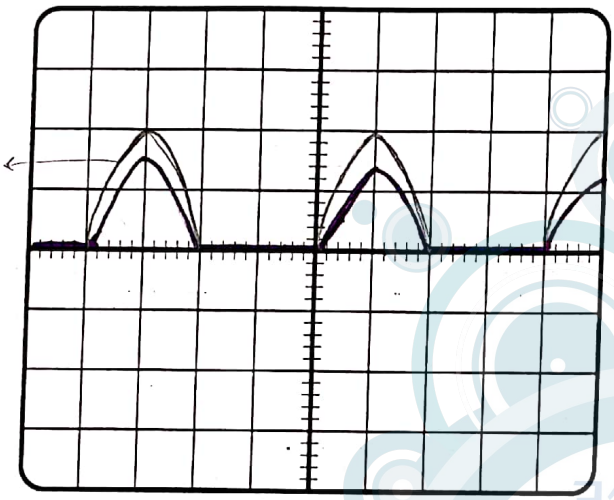
11. For the above plot, state your conclusions under the plot?

PROCEDURE C – HALF-WAVE RECTIFIER (FILTERED VS. UNFILTERED)

4. What is the difference between the signal you see on CH1 (input v_s) and the signal on CH2 (output v_R)?

The signal on the CH_2 doesn't show the negative part (half wave).

5. Draw the output signal v_R (CH2) you see on the oscilloscope screen below.



Volt/Div (CH2): 5 V

Time/Div: 500 µs

Maximum value of v_R: 10.1 V

Minimum value of v_R: 0 V

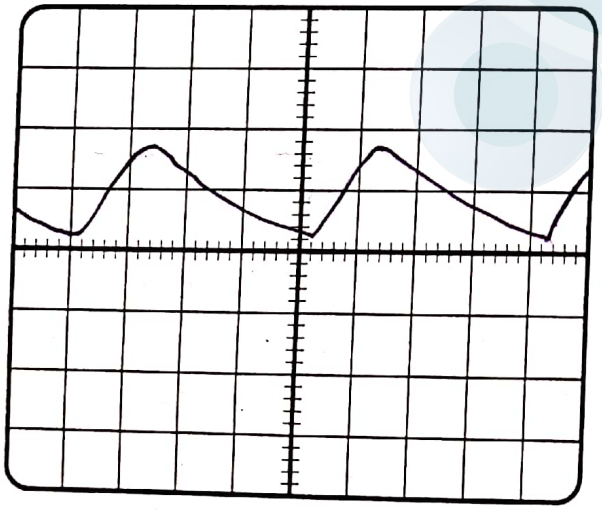
Ripple of v_R (Max – Min): 10.1 V

Average value of v_R: 3.13 V

9. What has changed for the new output signal v_R (on CH2) compared to the earlier plot? Is the new output signal closer to a DC signal compared to the earlier output or not?

It is closer to a DC signal compared to the earlier output and the ripple decreased

10. Draw the output signal v_R (CH2) you see on the oscilloscope screen below.



Volt/Div (CH2): 5 V

Time/Div: 500 µs

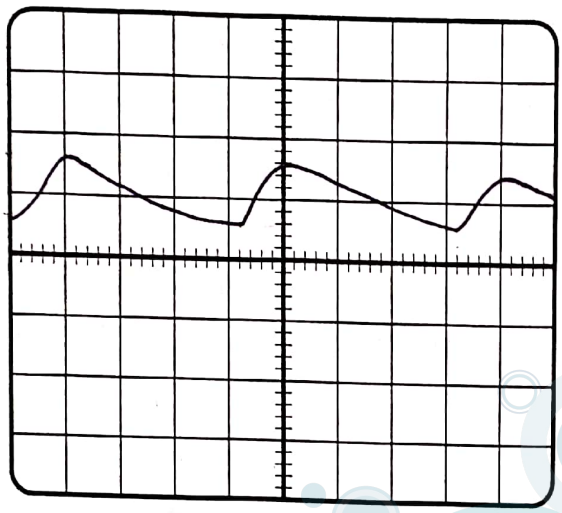
Maximum value of v_R: 8.39 V

Minimum value of v_R: 1.2 V

Ripple of v_R (Max – Min): 7.19 V

Average value of v_R: 4.3 V

12. Keep the same above circuit connected but now use R = 1000 Ω and C = 2.2 μF. Draw the new output signal (CH2) you see on the oscilloscope screen below, along with making the appropriate measurements next to the plot.



Volt/Div (CH2): 5v

Time/Div: 500 μs

Maximum value of v_R: 8.19 V

Minimum value of v_R: 3 V

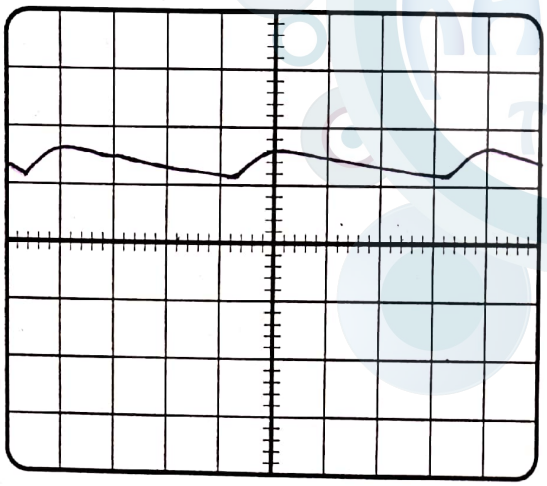
Ripple of v_R (Max – Min): 5.19 ↓ V

Average value of v_R: 5.18 ↑ V

13. What has changed on the output signal v_R on CH2? Is that output closer to a DC signal compared to the earlier output or not?

The ripple decreased and the output become closer to the DC signal compared with the previous one.

14. Using the same above circuit make sure you now use R = 4700 Ω and C = 2.2 μF. Draw the new output signal (CH2) you see on the oscilloscope screen below, along with making the appropriate measurements next to the plot.



Volt/Div (CH2): 5V

Time/Div: 500 μs

Maximum value of v_R: 8.39 V

Minimum value of v_R: 5.6 V

Ripple of v_R (Max – Min): 2.79 ↓ V

Average value of v_R: 7.07 ↑ V

15. Is there a difference between this signal and the one you obtained in step 12 above? State your conclusions? yes there is, by increasing the value of R and C the value of the time constant (τ) become larger than ($T = 1/f$), then the ripple become smaller. and the average value of v_R increased.

16. What is the average value for a DC signal (not AC signal) that is V_s = 10 V?

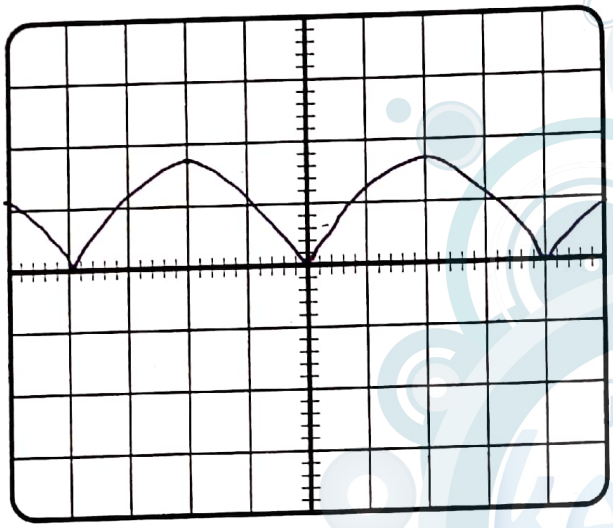
7.07

PROCEDURE D – FULL-WAVE RECTIFIER (FILTERED VS. UNFILTERED)

4. What is the difference between the signal you see on CH1 (input v_s) and the signal on CH2 (output v_R)? How is that different than a half-wave rectifier output (*see* procedure C)?

The negative input wave becomes positive in output signal (full wave)
↓
half

5. Draw the output signal v_R (CH2) you see on the oscilloscope screen below. You can use the **RUN/STOP button** on the oscilloscope to freeze CH2 if you have difficulty getting a stable signal due to triggering of the oscilloscope.



Volt/Div (CH2): 5

Time/Div: 500µs

Maximum value of v_R: 8.44 V

Minimum value of v_R: 0 V

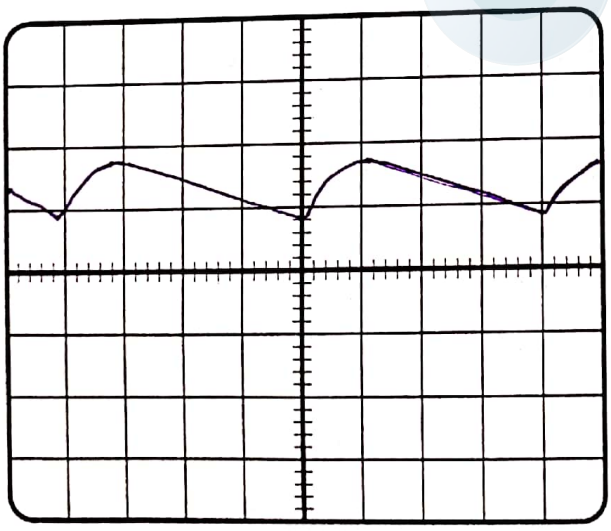
Ripple of v_R (Max – Min): 8.44 V

Average value of v_R: 4.26 V

9. What has changed for the new output signal v_R (on CH2) compared to the earlier plot? Is the new output signal closer to a DC signal compared to the earlier output or not?

The min. value becomes larger than zero and the signal become closer to DC signal

10. Draw the output signal v_R (CH2) you see on the oscilloscope screen below.



Volt/Div (CH2): 5

Time/Div: 500µs

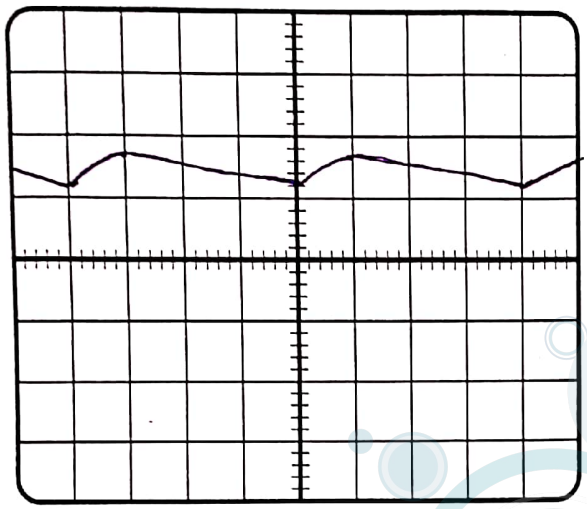
Maximum value of v_R: 8.43 V

Minimum value of v_R: 4.45 V

Ripple of v_R (Max – Min): 3.98 V

Average value of v_R: 6.22 V

12. Keep the same above circuit connected but now use R = 1000 Ω and C = 2.2 μF. Draw the new output signal (CH2) you see on the oscilloscope screen below, along with making the appropriate measurements next to the plot.



Volt/Div (CH2): 5

Time/Div: 500 μs

Maximum value of v_R: 8.42 V

Minimum value of v_R: 6.06 V

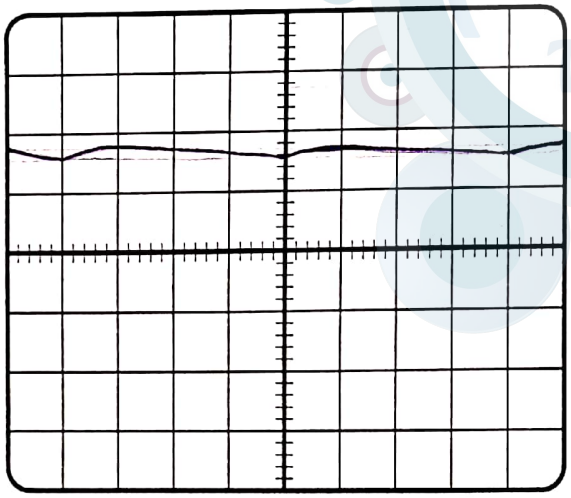
Ripple of v_R (Max – Min): 2.36 V

Average value of v_R: 7.2 V

13. What has changed on the output signal v_R on CH2? Is that output closer to a DC signal compared to the earlier output or not?

yes it is

14. Using the same above circuit make sure you now use R = 4700 Ω and C = 2.2 μF. Draw the new output signal (CH2) you see on the oscilloscope screen below, along with making the appropriate measurements next to the plot.



Volt/Div (CH2): 5

Time/Div: 500 μs

Maximum value of v_R: 8.49 V

Minimum value of v_R: 7.83 V

Ripple of v_R (Max – Min): 0.66 V

Average value of v_R: 8.12 V

15. Is there a difference between this signal and the one you obtained in step 12 above? State your conclusions?

Yes there is a difference in the ripple which become smaller and the average value become closer to the required value.