Electrical and Computer Engineering Department

Circuit Analysis- ENEE2304

PSpice Assignment

Second Semester 2020/2021

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Section: #2

Subject: Report of the Pspice Project

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Q1):

A) Construct a PSPICE schematic for the circuit shown in Figure 1. Simulate the schematic and show voltages at each node and current in each branch.

Answer: In this circuit Figure (1), as shown in this figure below after implementing the circuit and simulating, there are no errors and the values of voltages and currents in each branch are shown in the figure in the correct way, and there is no problem in this question, and this circuit doesn't need explanation, because it's very simple, and in figure (2) is shown the values of currents, and we use DC Sweep

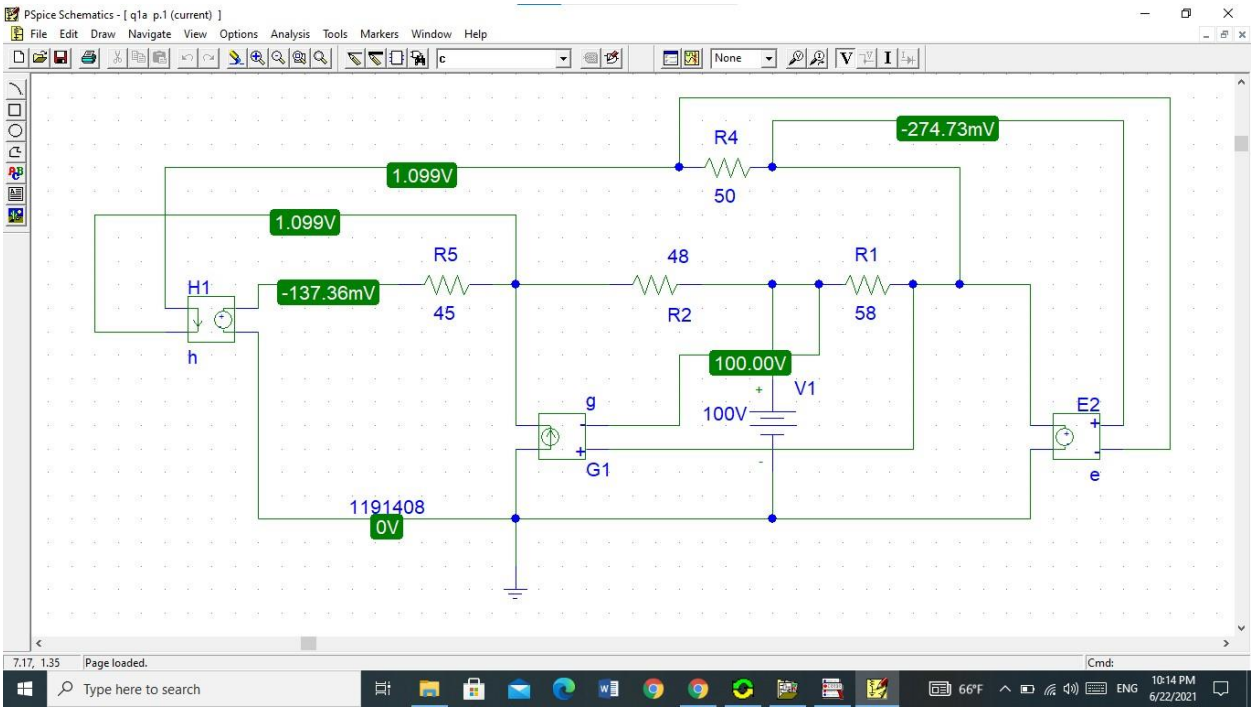

Figure (1): The Voltages Value

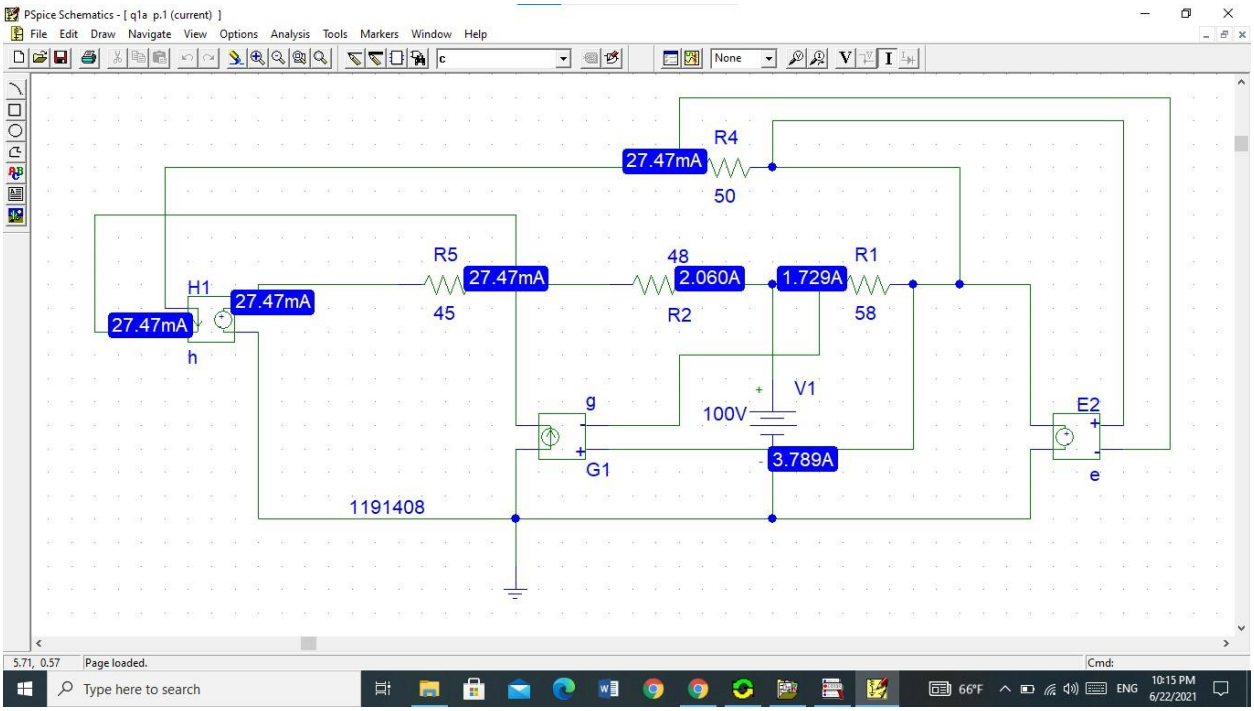

Figure (2): The Currents Value

B) Construct a PSpice schematic for the circuit shown in Figure 2. Using PSpice only (without calculations), find R such that maximum power is delivered to R.

Answer: In this Circuit, as shown in figure (3) the resistor number R2, I do it unknown value RX and use parameter and give the initial value RX=10 ohm, and the value increased by the values of another resistors and voltages, currents, in the graph after simulate we must use the cursor max to get the maximum power of the RX value and the Value Of Maximum Power We Can Use The Rule Of it as shown in figure (hint), in this circuit to get the solution you will use the Thevenin way to get the resistor Rth and Vth and calculate the maximum power of circuit, we put the start value =1 and final value = 60, increment = 1m in DC sweep properties, in the graph we use the rule(I(R2) * I(R2)*(Rx)) to get the maximum power value, and the value of maximum power in my graph Pmax = 32.143 Watt and it shows in figure(5), after read the cursor max coordinates I find RX = 27.990 ohm when we achieve to the maximum power = 32.134 watt that equal quarter of the power for Rth and Vth

$$P_{\max} = \left[\frac{V_{Th}}{R_{Th} + R_L}\right]^2 \times R_L \Big|_{R_L = R_{Th}}$$

$$= \frac{V_{Th}^{\,2}}{4 R_{Th}}$$

Figure (hint): the rule to get maximum power

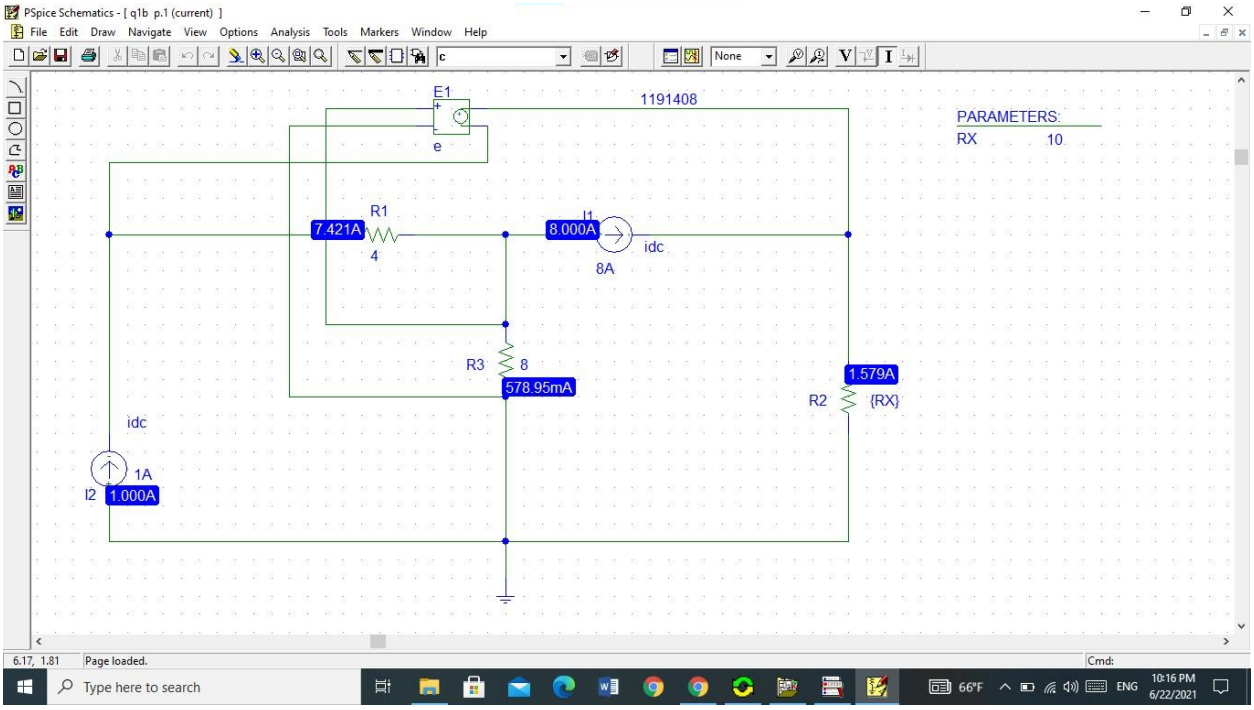

Figure (3): the value of currents

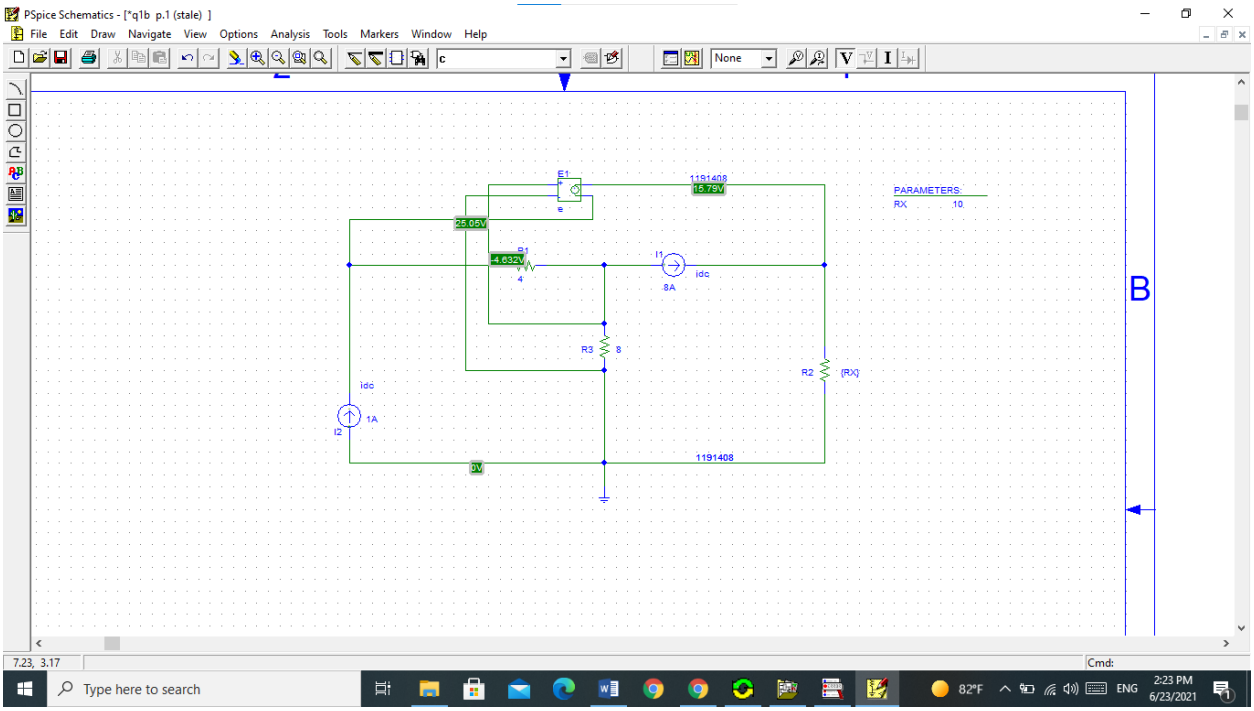

Figure (4): the value of voltages

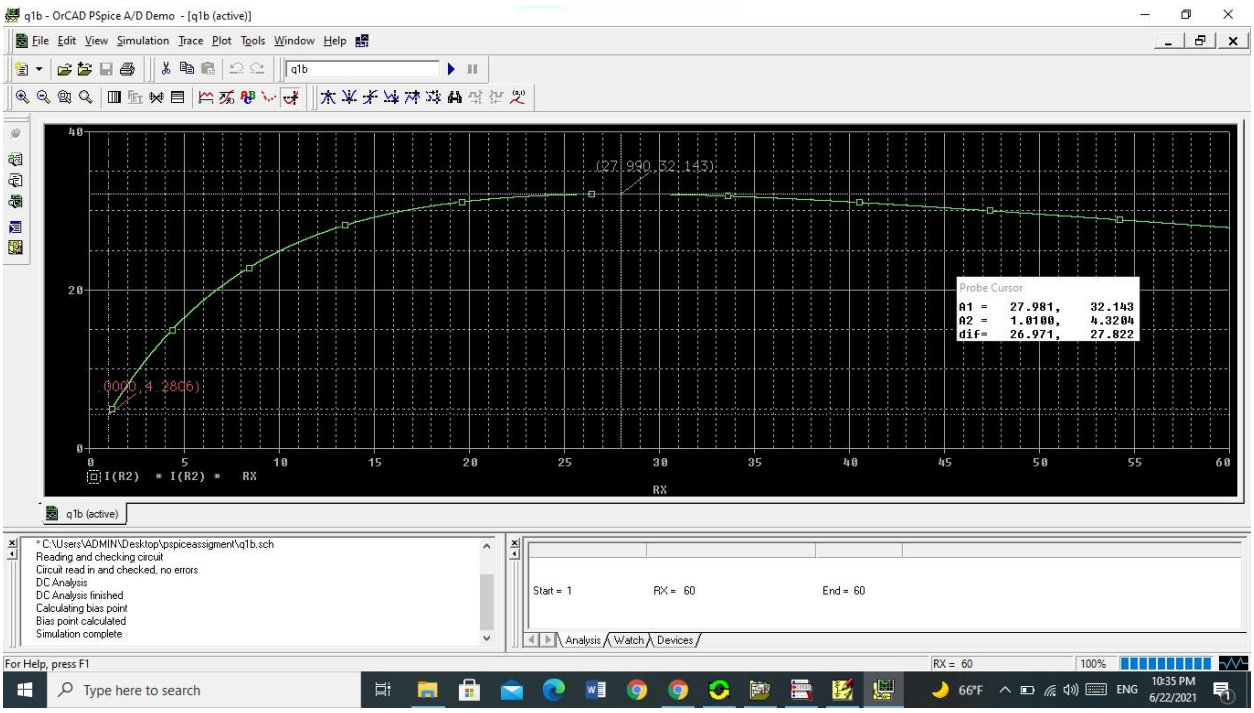

Figure (5): The Maximum Power Graph

Q2)

A) Construct a PSpice schematic for the circuit shown in Figure3. What is the value of ω that makes the current ig in phase with the source voltage vg? Simulate the schematic at that frequency and use markers to plot vg (t) and ig (t). What is the power dissipated in the 1K resistor?

Answer: in this circuit, first, we calculate the omega value (ω) and get the frequency value to use it in Vsin properties to get the correct value and we use the rule in figure (hint2) to get these values and to draw and simulating, firstly I will show the circuit in figure (6) and the voltages and currents value, and simulate the circuit with time transient and put the values of start and delay so we put the print step = 533.748 us and we calculate it by see the voltage graph and get the second max of top of signal and get this value so we can put it the start value , and we can find it in another way by see the current graph and get the top value in signal and test the values you find and check if the value fit with your values and maintain that there is no phase shift, and we can get the final value of graph by get the periodic time and multiply it by the number of times you want to repeat the signals ((1\frequency) * (times)) and the step

celling value is 1u , and the No-Print Delay Value = print step until get correct graph, after get the graphs and see it , I made sure there is not phase shift from voltage and current graph in circuit values. 4

$$\omega^2 = \frac{L - R^2C}{L^2C}$$

Figure (hint2): the rule to get the frequency and omega values

The frequency in my circuit was F= 1876.5683911210715 Hz

Phase = 90 degree

Vampl (Vmax) = 15 Volt as shown in the pdf

Voff = 0 Volt

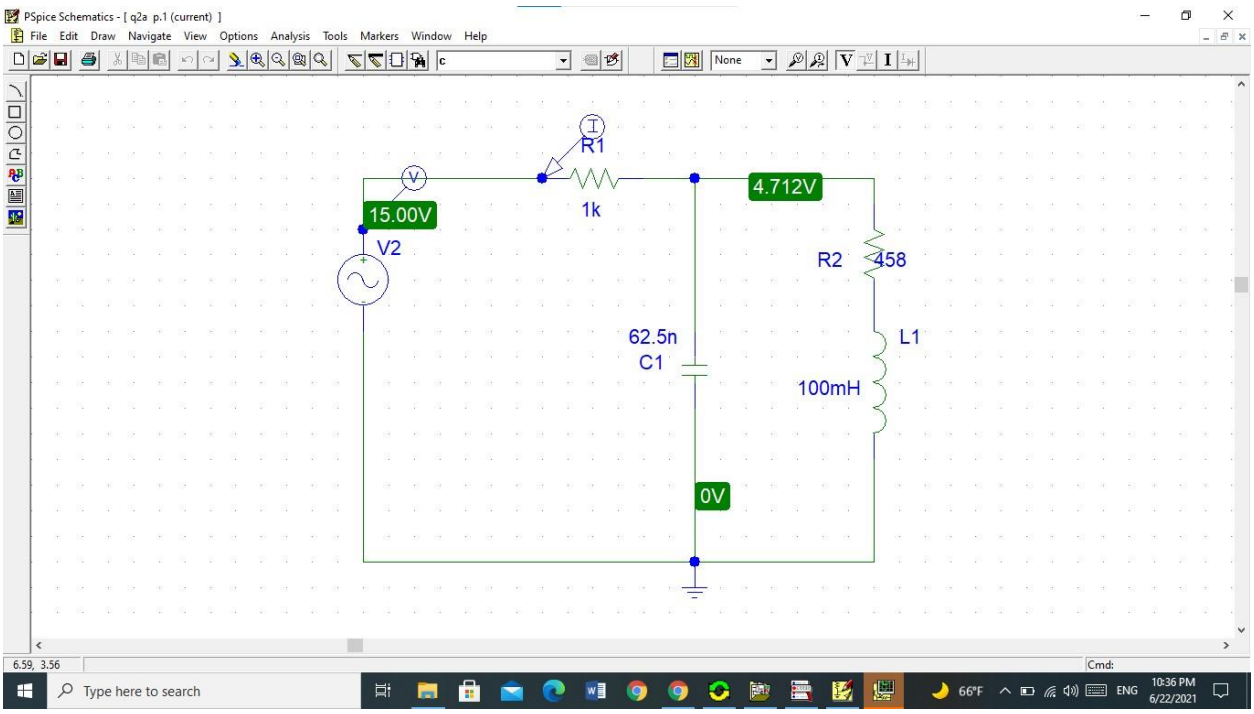

Figure (5): The Value of Voltages

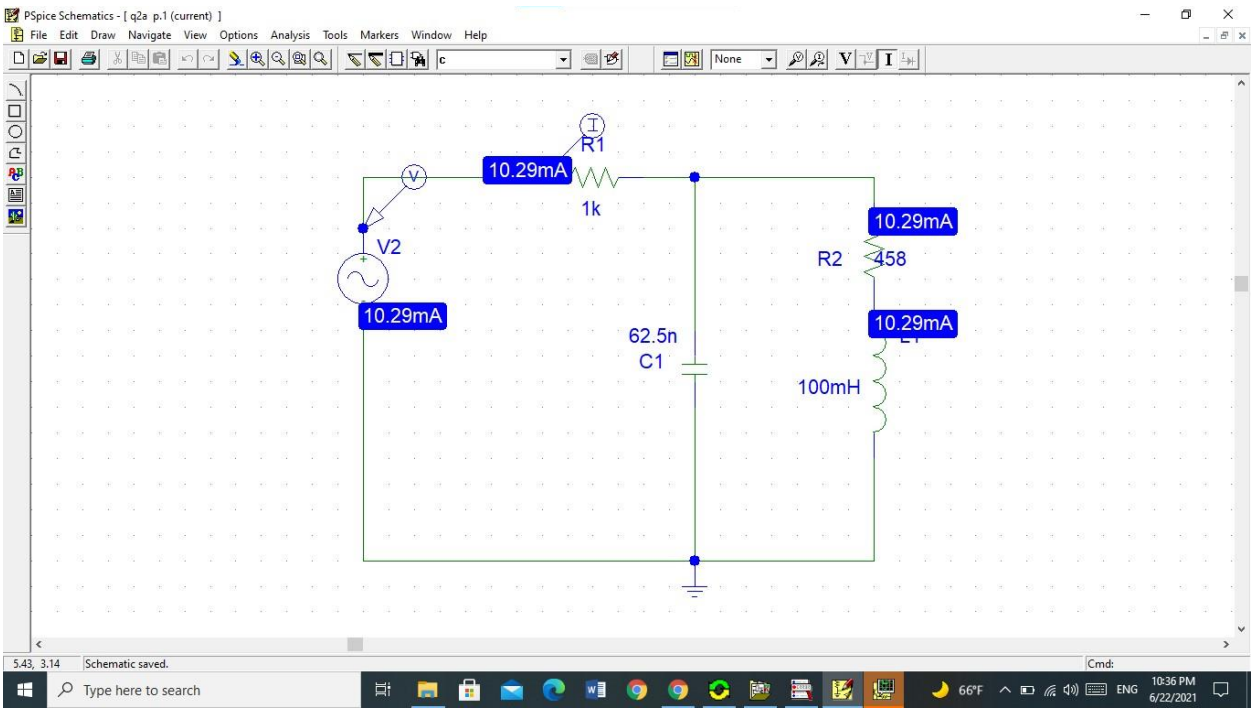

Figure (6): The Value of Currents

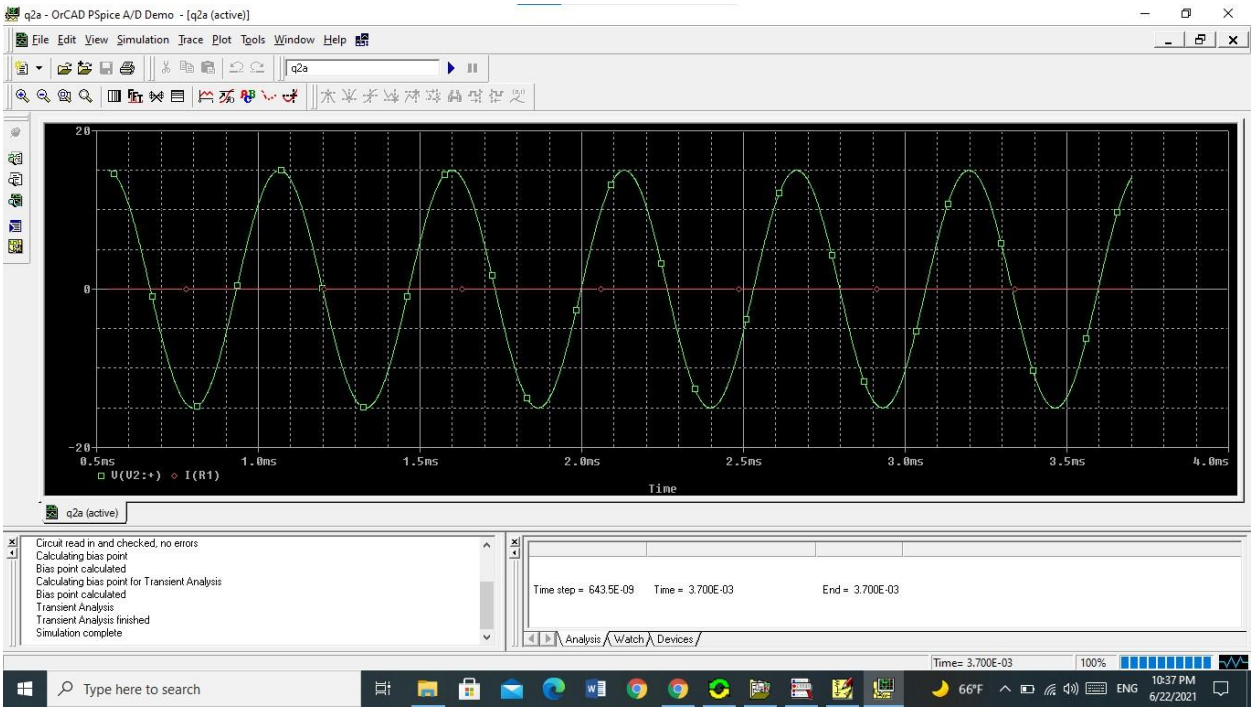

Figure (7): The Graph that explains the current and voltage values using signals

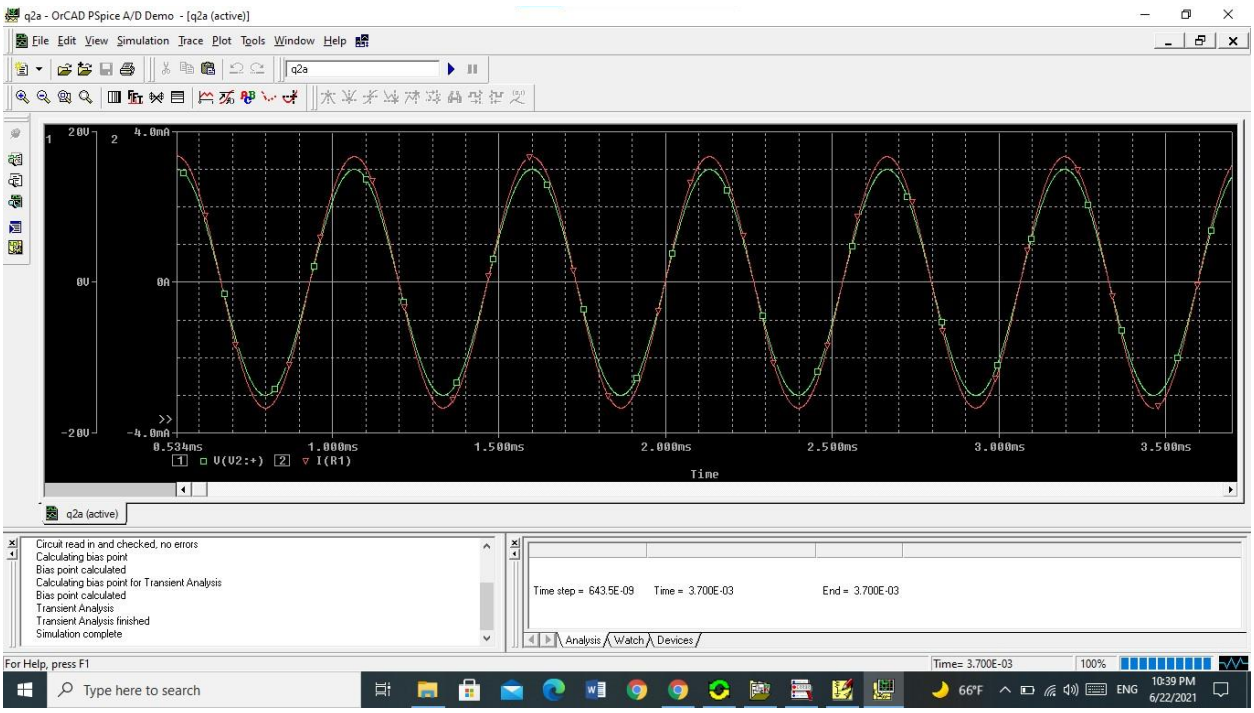

Figure (8): the graph that makes you sure there is no phase shift and the relation between voltage and current

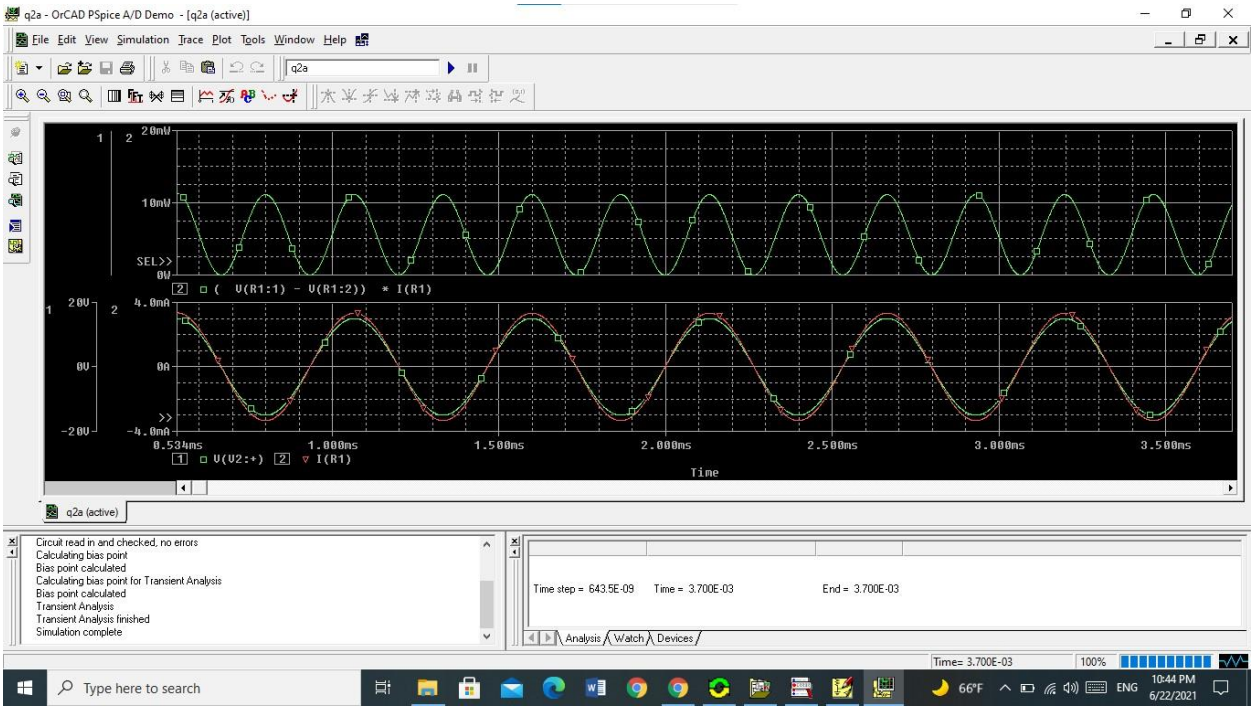

Figure (9): the graph that shows the power dissipated using the rule (V1 (R1:1)-V1 (R1:2)) * I (R1)

B) Construct a PSpice schematic for the circuit shown in Figure 4. Using simulation show the frequency response of the circuit. Determine what type of filter is shown in Figure 4. Determine the resonance frequency. Use C=0.1µ F, H=2mH, and R=ZYΩ. Use the suitable voltage source.

Answer: In This Circuit, as shown we use the suitable voltage source and I choose Vac because we use capacitor and inductor in this circuit and this means that we use AC Sweep and we use Decade Ac Sweep Type we use decade because it explains the circuit precisely and the decade means the unit for measuring ratios on a logarithmic and make the Pts\Decade = 1000 and the start frequency = 1 and end frequency = 2000.0K, after the draw the circuit and simulating I find that the filter is bandpass because the passes frequencies within a certain range and rejects (attenuates) frequencies outside that range, I will show the max value of frequency to show it is a bandpass filter, and we can make it simple without graph and by calculations, the explanation in figures below.

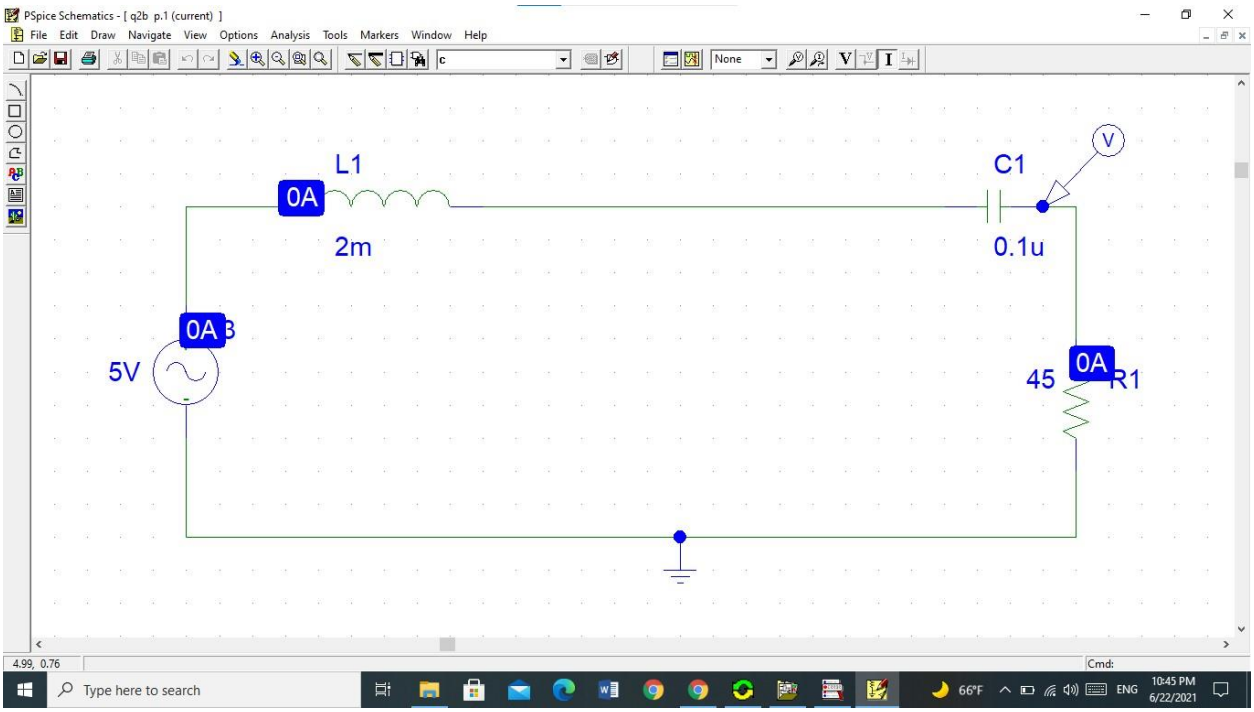

Figure (9): The circuit drawn

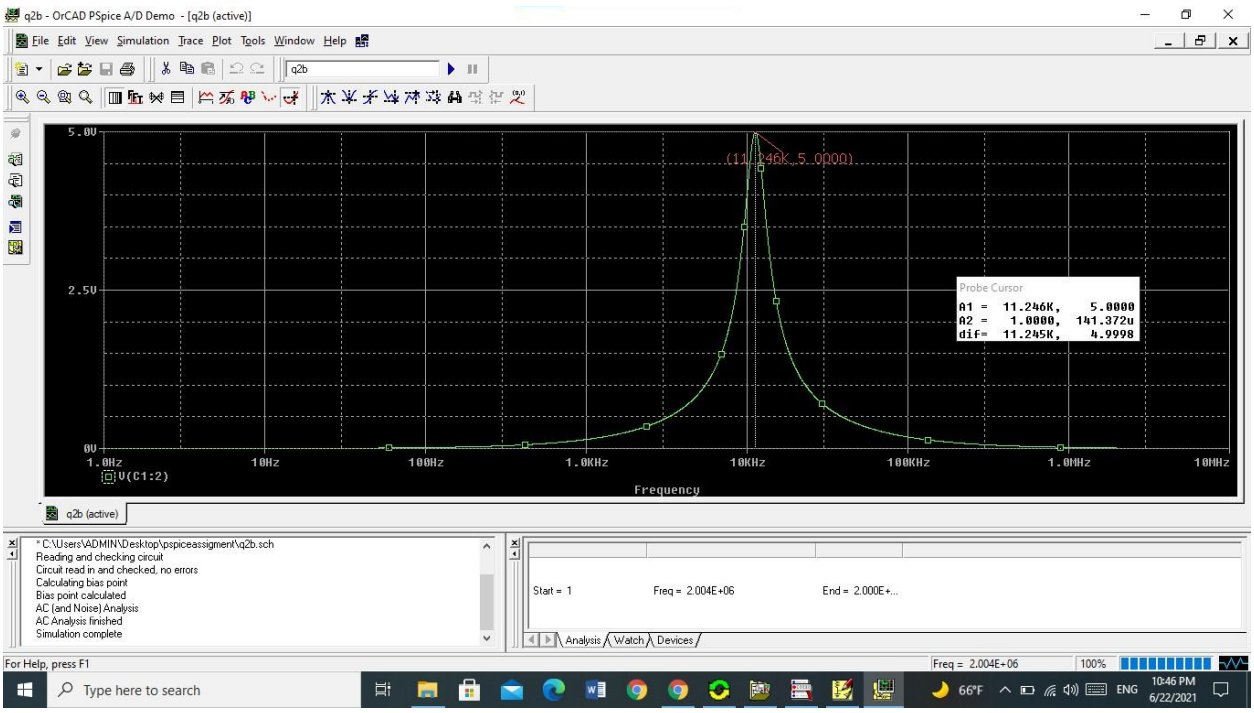

Figure (10): the graph that shown the max value of frequency and rejects the low values of max and the high value of max and we must reject these values and get the max value to define and know the type of filter.