Lab 12: Transient, AC and DC Sweep Analyses

Objective:

* Transient, AC and DC Sweep Analysis

Lab12a:

1. Perform Transient Analysis on the circuit shown in Figure 12.1. Set VIN to be SIN wave of frequency 10K and amplitude of 10V, use a stop time of 500us.

To set up the analysis:

- (a) Click Launch>ADE L
- (b) Click Analyses>Choose or Choose Analyses Icon
- (c) In the Analysis Section, select tran
- (d) Set the Stop Time to **500u**.
- (e) Click Enabled and OK.
- (f) Click **Create>Pin** or **Create Pin Icon** to add input pin **VIN** (set direction in the dialog to **input**). Note: when creating output pin, change the direction in the dialog to be **output**.



Figure 12.1 lab12a Circuit for Transient Analysis

- 2. To set up the forces for VIN:
 - (a) Click Setup > Stimuli Click Enabled Function: sin Amplitude: 10 Frequency: 10K

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Figure 12.2 Setup Stimuli

- **3**. To trace the waveforms of VIN, node 1 and node 2 voltages.
 - (a) Click Outputs>To Be Plotted>Select On Schematic or Setup Outputs Icon
 - (b) Select **VIN**, 1 & 2 by clicking on the wire.
 - (c) Click Simulation>Netlist & Run or Netlist and Run Icon
 - (d) Click **OK**.
 - (e) To print waveform, click **File>Print**
- 4. From basic AC circuit theory, calculate the voltage at nodes 1 and 2. Compare the calculated values with the simulation results.

Lab12b:

1. Perform an AC analysis on the lab8b circuit shown in Figure 12.3. (Note: You may save a copy of lab8a as lab8b and alter the values of the components). Perform AC analysis on this circuit. Set frequency range from 10Hz to 100KHz with AC Magnitude of 10V.

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Figure 12.3 lab12b Circuit

- 2. To set up AC Analysis :
 - (a) Click Launch>ADE L
 - (b) Click Analyses>Choose Analysis or Choose Analyses Icon
 - (d) In the Analysis Section, select **ac**
 - (e) Set the Sweep Variable to **Frequency**
 - (f) Set the Sweep Range to **Start-Stop** (Start:10, Stop:100K)
 - (g) Set the Sweep Type to Logarithmic, Points per decade: 1000
 - (h) Click **Enabled** and **OK**

3. To set up VIN: Click Setup>Stimuli Click Enabled. Select function as sin AC Magnitude: 10V AC Phase: 0

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Fig 12.4 Setup Stimuli - VIN

4. Plot waveform of node 2 using Outputs>To Be Plotted>Select On Schematic or Setup Outputs Icon. From the waveform, deduce the resonant frequency and the peak inductor voltage.

Lab12c:

1. Perform an AC analysis on the circuit show in Figure 12.5 to study the effect of frequency from 10Hz to 100KHz.



Figure 12.5 lab12c Circuit

- 2. Set up VIN according to the following: Click Setup>Stimuli Click Enabled. Select function as sin AC Magnitude: 10V AC Phase: 0
- 3. Plot waveform of VOUT using Outputs>To Be Plotted>Select On Schematic or Setup Outputs Icon.
- 4. From the waveform, deduce the **resonant frequency** and peak voltage of **VOUT**.

Lab12d:



1. Perform a DC sweep analysis on the circuit shown in Figure 12.6.

Figure 12.6 lab12d Circuit

- 2. To setup a DC sweep Analysis:
 - (a) In the Analysis Section, select **dc**.
 - (b) Click Save DC Operating Point.
 - (c) Set the Sweep Variable to **Component Parameter**.
 - (d) Click on **Select Component**. This allows us to select instance on the schematic.
 - (e) Click on the **supply source vdc** from schematic window.
 - (f) A form appears which list all the instances parameters. Select **dc** and Click **OK**.
 - (g) In the Sweep Range section, select **Start-Stop** (Start: **0** Stop: **10**).
 - (h) Click **Enabled** and **OK**.
- 3. Run the simulation and trace of waveform of VIN, node 1 and 2.
 - (a) Click Outputs>To Be Plotted>Select On Schematic or Setup Outputs Icon
 - (b) Click on the wires to select **Vin**, **1** and **2**.
 - (c) Click Simulation>Netlist and Run or Netlist and Run Icon. Click OK.
 - (d) Deduce nodes 1 and 2 voltages when VIN is 5V.