Microelectronic Circuits
8th Edition

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Spice Problems Solutions
Chapter 4

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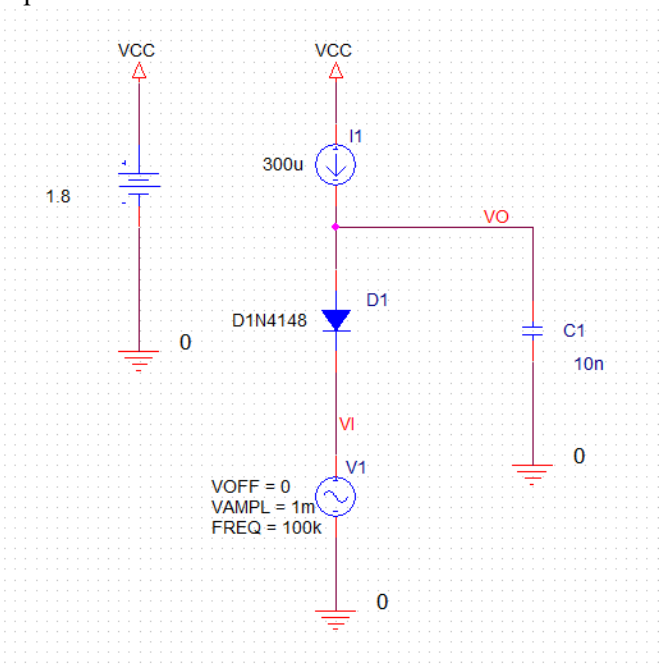
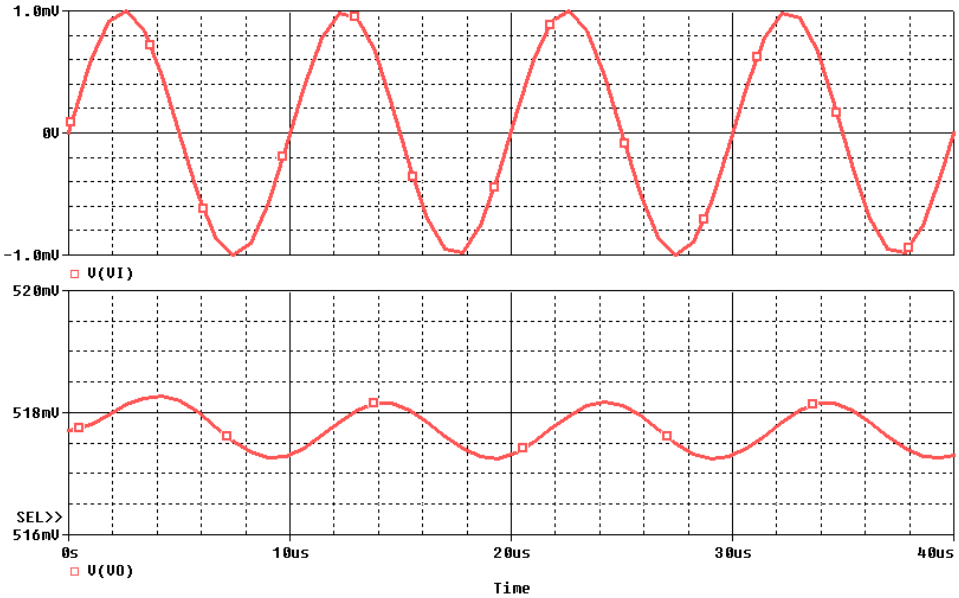
Problem: 4.56

1. The schematic for this problem is shown below



2. Run the netlist and perform the transient analysis. Plot V(VI) and V(VO). For -45 degree phase shift the waveform should shift by 1.25 us. It happens when I=160uA.



3. Using similar simulations, find the phase shift for I=16 uA and I=1.6 mA.

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Netlist:

Copy the netlist given below and paste it into a text file and save it with *.cir extension.

```
********Problem: P4_56        ***************
******* Main circuit begins here**************
D1          VO VI D1N4148
V1          VI 0
+SIN 0 1m 100k 0 0 0
V_sup          VCC 0 1.8
C1          0 VO  10n
I1          VCC VO DC 300u
******* Main circuit ends here **************


******** Model of D1N4148 begins here****************
.model D1N4148  D(Is=2.682n N=1.836 Rs=.5664 Ikf=44.17m Xti=3 Eg=1.11 Cjo=4p
+               M=.3333 Vj=.5 Fc=.5 Isr=1.565n Nr=2 Bv=100 Ibv=100u Tt=11.54n)
******** Model of D1N4148 ends here****************

******** Analysis begins here****************
.TRAN   0.01uS  40uS
*.STEP LIN PARAM AMPL 1 3 0.5
.PROBE
.END
******** Analysis ends here****************
```


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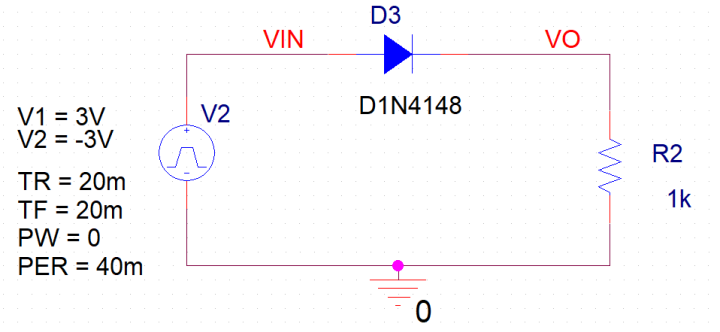
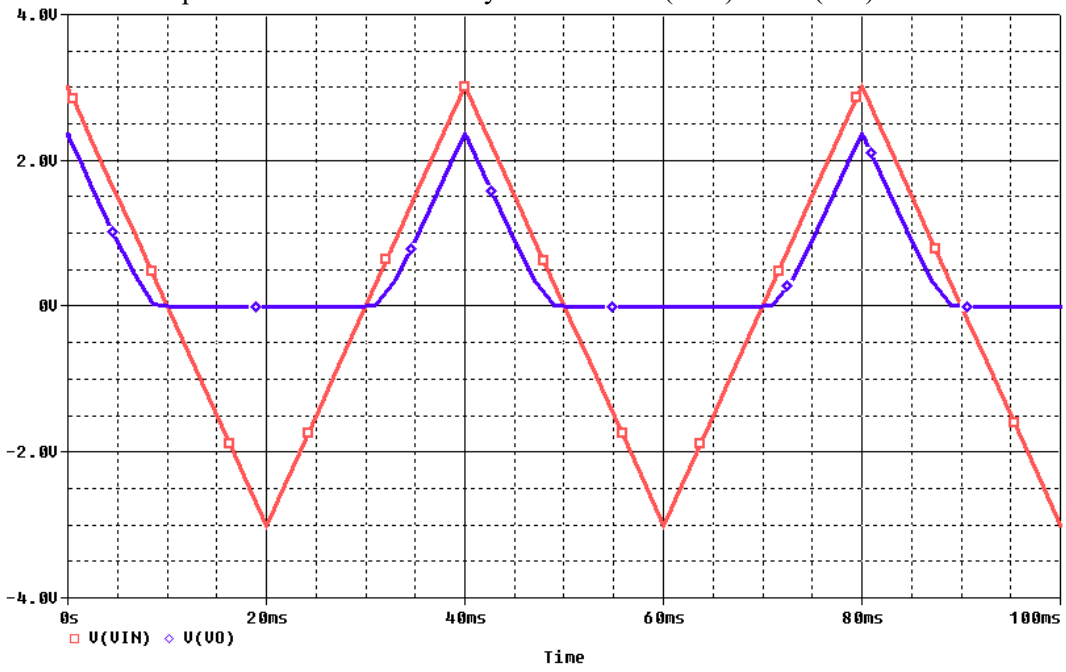
Problem: 4.67

1. The schematic for this problem is shown below



2. Run the netlist and perform the transient analysis. Plots of V(VIN) and V(VO) are shown below.



3. Calculate the average of VO by using the trace expression YatLastX(AVG(V(VO))) (*this expression is valid only in PSpice. Enter this expression by selecting Trace->Evaluate Measurement*). It is 504.6 mV

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Netlist:

Copy the netlist given below and paste it into a text file and save it with *.cir extension.

```
********Problem: P4_67        ***************
******* Main circuit begins here**************

D_D3          VIN VO D1N4148
R_R2          0 VO  1k
V_V2          VIN 0
+PULSE 3V -3V 0 20m 20m 0 40m
******* Main circuit ends here **************

******** Model of D1N4148 begins here****************
.model D1N4148  D(Is=2.682n N=1.836 Rs=.5664 Ikf=44.17m Xti=3 Eg=1.11 Cjo=4p
+               M=.3333 Vj=.5 Fc=.5 Isr=1.565n Nr=2 Bv=100 Ibv=100u Tt=11.54n)
******** Model of D1N4148 ends here****************

******** Analysis begins here****************
.TRAN   0.01mS  100mS
.PROBE
.END
******** Analysis ends here****************
```


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