Microelectronic Circuits
8th Edition
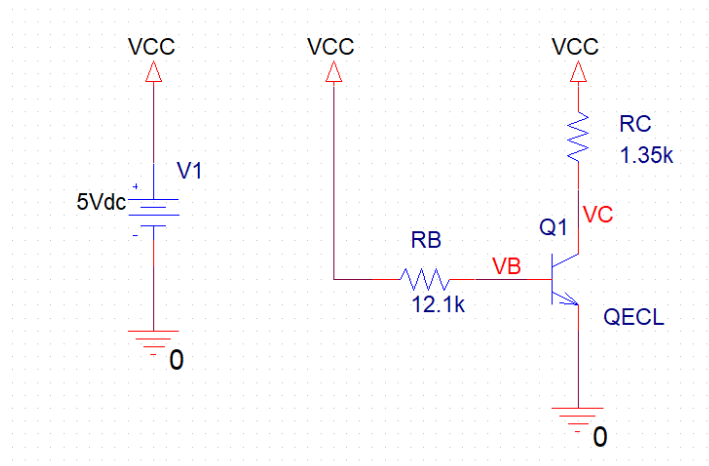
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Spice Problems Solutions
Chapter 6

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Problem: 6.49

1. The schematic for this problem is shown below.

2. Run the netlist and calculate the operating point. The total power drawn from the supply is 20mW as shown below

```
VOLTAGE SOURCE CURRENTS
NAME            CURRENT

V1              -4.001E-03

TOTAL POWER DISSIPATION   2.00E-02  WATTS
```

3. The current IB and IC are given below. The forced β is the ratio IC/IB=10.4.

```
NAME          Q1
MODEL         QECL
IB            3.48E-04
IC            3.65E-03
VBE           7.87E-01
VBC           7.19E-01
VCE           6.84E-02
BETADC        1.05E+01
```
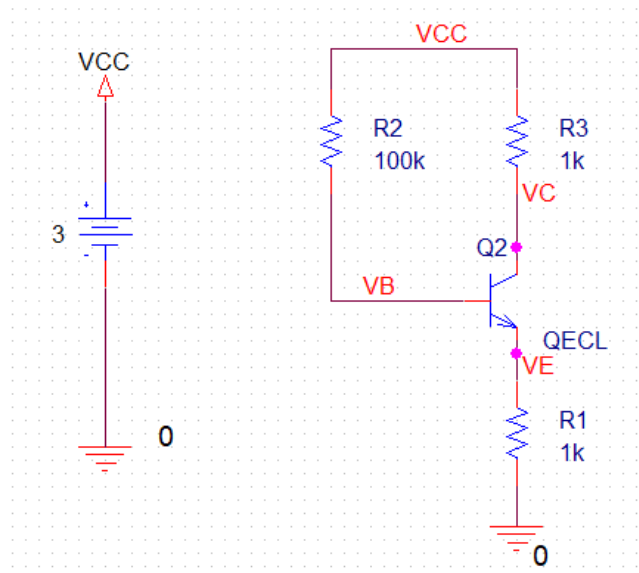
Netlist:

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

```
********Problem: P6_49       ***************
******* Main circuit begins here***************
Q1          VC VB 0 QECL
RB          VCC VB  12.1k TC=0,0
RC          VC VCC  1.35k TC=0,0
V1          VCC 0 5Vdc
******* Main circuit ends here*******************************************
************ Model for ECL BJT begins here*******************************
.model QECL    NPN(Is=0.26fA Bf=100 Br=1 Tf=0.1ns Cje=1pF Cjc=1.5pF Va=100)
************ Model for ECL BJT begins here*******************************

******** Analysis begins here*****************
.OP
******** Analysis ends here*****************
```

Problem: 6.60

1. The schematic for this problem is shown below.

2. Run the netlist and calculate the operating point. Open the "output file" and see the node voltages and find out VB, VC and VE.

NODE	VOLTAGE	NODE	VOLTAGE	NODE	VOLTAGE	NODE	VOLTAGE
(VB)	1.8818	(VC)	1.8818	(VE)	1.1294	(VCC)	3.0000

3. Change R2 to 10 kΩ and 1 kΩ and find the voltages again.

Netlist:

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

```
********Problem: P 6.60              ***************
******* Main circuit begins here***************
Q2         VC VB VE QECL
R1         0 VE   1k TC=0,0
R2         VB VCC   100k TC=0,0
R3         VC VCC   1k TC=0,0
V_sup         VCC 0 3
******* Main circuit ends here*********************************************

************ Model for ECL BJT begins here*******************************
.model QECL    NPN(Is=0.26fA Bf=100 Br=1 Tf=0.1ns Cje=1pF Cjc=1.5pF Va=100)
************ Model for ECL BJT begins here*******************************

******** Analysis begins here*****************
.OP
.END
******** Analysis ends here*****************
```

Chapter 6