PH-218 Analog & Digital Electronics

Assignment-4 (Due date: 21st March 2011)

1. The following specifications are given for the dual input, balanced-output differential amplifier: $R_C = 2.2\ k\Omega$, $R_B = 4.7k\Omega$, $R_{in\,1} = R_{in\,2} = 50\Omega$, $+V_{CC} = 10V$, $-V_{EE} = -10\ V$, $\beta_{dc} = 100$ and $V_{BE} = 0.715V$.

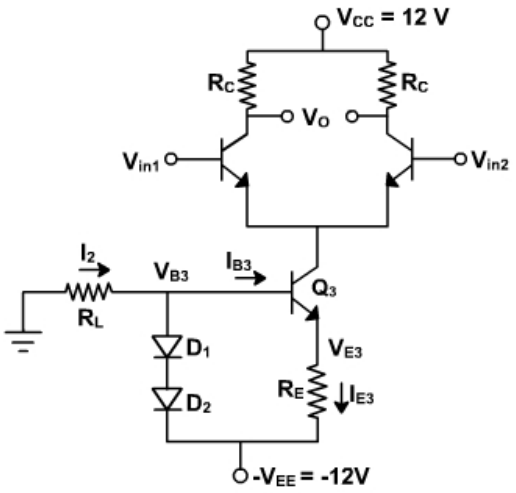
    a. Determine the voltage gain.
    b. Determine the input resistance
    c. Determine the output resistance.

2. For the dual input, balanced output differential amplifier of Example-1:

    a. Determine the output voltage (v_o) if $v_{in\,1} = 50mV$ peak to peak (pp) at 1 kHz and $v_{in\,2} = 20$ mV pp at 1 kHz.
    b. What is the maximum peal to peak output voltage without clipping?

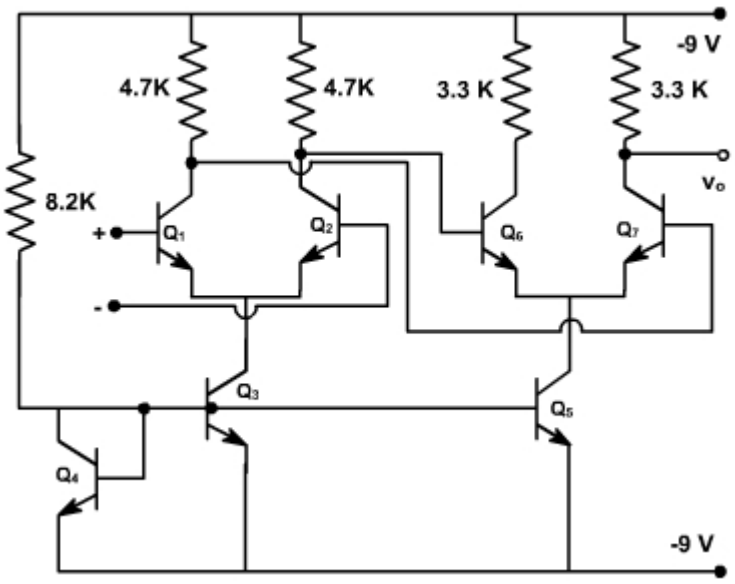
3. Determine the value of all the components for the fig shown below which is dual-input balanced output differential amplifier using the diode constant current bias and have the following specifications.

    1. supply voltage = ± 12 V.
    2. Emitter current I_E in each differential amplifier transistor = 1.5 mA.
    3. Voltage gain ≤ 60.



4. For the circuit show in fig., it is given that $\beta = 100$, $V_{BE} = 0715V$. Determine

(a) The dc conditions for each state
(b) The overall voltage gain
(c) The maximum peak to peak output voltage swing



5. Determine the output voltage and draw the transfer characteristics in each of the following cases for the open loop differential amplifier of fig.:

a. $v_{in\,1} = 5\ \mu V$ dc, $v_{in\,2} = -7\ \mu V_{dc}$
b. $v_{in\,1} = 10$ mV rms, $v_{in\,2} = 20$ mV rms