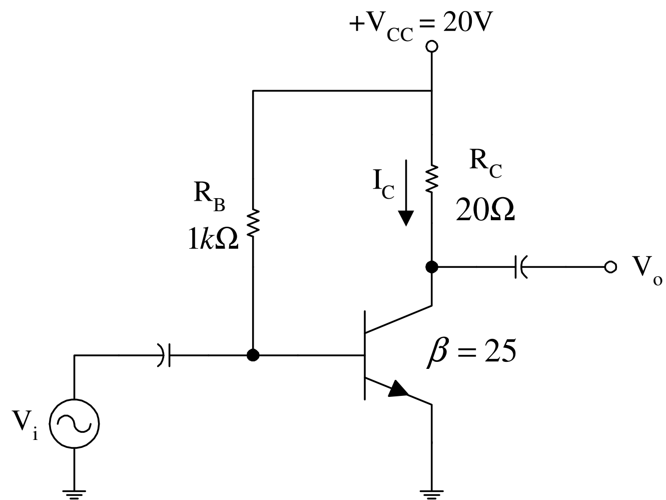
PH-218 Analog & Digital Electronics

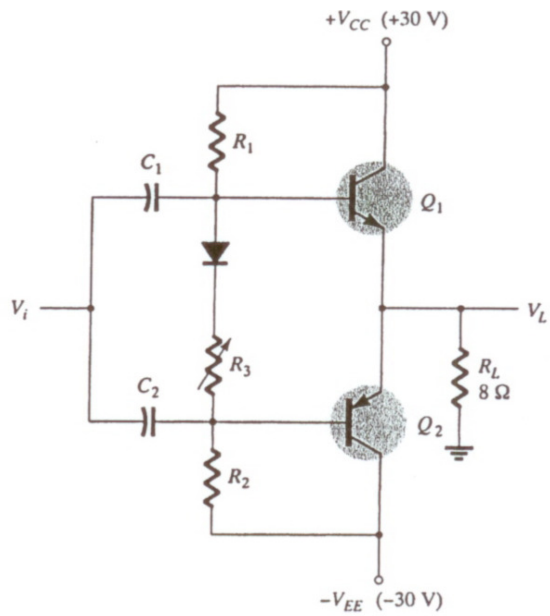
Assignment-3 (Due date: 11th March 2011)

1. Calculate the input power, output power, and efficiency of the amplifier circuit for an input voltage that results in a base current of 10mA peak.



2. A transformer-coupled class A amplifier drives a 16ohm speaker through a 3.87:1 transformer. Using a power supply of Vcc=36V, the circuit delivers 2W to the load. Calculate –
   (a) P(ac) across transformer primary
   (b) V_L (ac)
   (c) V(ac) at transformer primary
   (d) The rms values of load and primary current
   (e) Efficiency of the amplifier

3. For the class B power amplifier shown in fig. below, Calculate the following–
   (a) Maximum Po(ac)
   (b) Maximum Pi(dc)
   (c) Efficiency of the amplifier
   (d) Maximum power dissipated by both the transistor



4. (a) Determine the maximum dissipation allowed for a 100W Si transistor (rated at 25°C) for a derating factor of 0.6W/°C at a case temperature of 150°C.

   4(b) A 160-W Si power transistor operated with a heat sink (θ_{sa} = 1.5W/°C) has θ_{jc} = 0.5W/°C and a mounting insulation of (θ_{cs} = 0.8W/°C). What maximum power can be handled by the transistor at an ambient temperature of 80°C? The junction temperature should not exceed 200°C.

5. Assume collector to emitter voltage can be represented in terms of cosine harmonics as given below: $V_{CE} = V_{CEQ} + V_0 + V_1 \cos(\omega t) + V_2 \cos(2\omega t)$
   Prove that second harmonic distortion can be expressed as

$$D_2 = \frac{\frac{1}{2}(V_{CE\,\max} + V_{CE\,\min}) - V_{CEQ}}{(V_{CE\,\max} - V_{CE\,\min})} \times 100\%$$

   Calculate the second harmonic distortion for an output waveform having measured values of $V_{CE_{\min}} = 2.4$ V, $V_{CE_Q} = 10$ V, and $V_{CE_{\max}} = 20$ V.