ECEN303 2019 Assignment

Power Amplifiers

Course contribution: 10%

All Questions are worth 10 marks each.

Due: 27 April 1159pm online.

Question 1:

I. An audio amplifier operates in the frequency range of
   a. 0 to 20 Hz
   b. 20 Hz to 2 kHz
   c. 20 to 20 kHz
   d. Above 20 kHz

II. For maximum peak-to-peak output voltage, the Q point should be
   a. Near saturation
   b. Near cutoff
   c. At the centre of the dc load line
   d. At the centre of the ac load line

III. An amplifier has two load lines because
   a. It has ac and dc collector resistances
   b. It has two equivalent circuits
   c. DC acts one way and ac acts another
   d. All of the above

IV. Push-pull is almost always used with
   a. Class A
   b. Class B
   c. Class C
   d. All of the above

V. Class C amplifiers are almost always
   a. Transformer-coupled between stages
   b. Operated at audio frequencies
   c. Tuned RF amplifiers
   d. Wideband

VI. The input signal of a class C amplifier
   a. Is negatively clamped at the base
   b. Is amplified and inverted
   c. Produces brief pulses of collector current
   d. All of the above

VII. If $R_C = 100\ \Omega$ and $R_L = 180\ \Omega$, the ac load resistance equals
   a. 64 Ω
   b. 90 Ω
   c. 100 Ω
   d. 180 Ω

VIII. In a class A amplifier, the collector current flows for
   a. Less than half the cycle
   b. Half the cycle
   c. Less than the whole cycle
   d. The entire cycle

IX. With class A, the output signal should be
a. Unclipped
b. Clipped on positive voltage peak
c. Clipped on negative voltage peak
d. Clipped on negative current peak

X. A small quiescent current is necessary with a class AB push-pull amplifier to avoid
a. Crossover distortion
b. Destroying the compensating diodes
c. Excessive current drain
d. Loading the driver stage

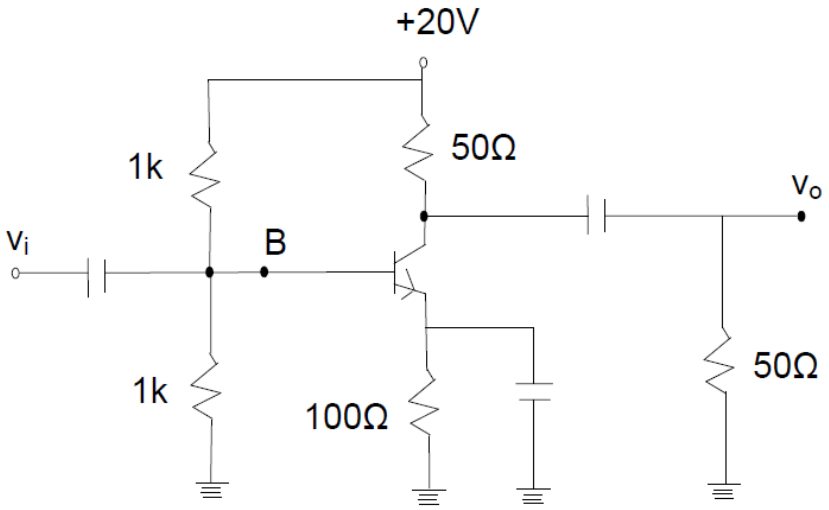
Question 2:

a) With reference to the class B amplifier, explain what is cross over distortion and what causes it.

b) Briefly describe, with the aid of diagrams, two methods that can be used to reduce the cross over distortion of a class B amplifier.

Question 3:

Calculate the input power, output power and the efficiency of the following A-class amplifier. Please note that you need to take R_E into account in your calculations.

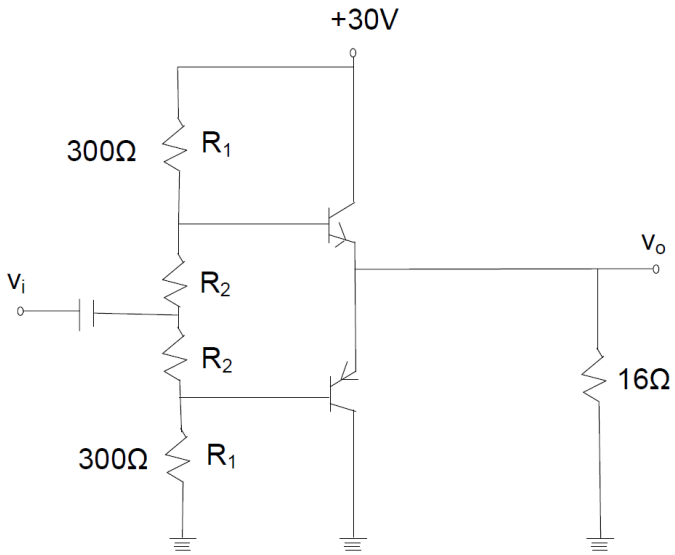


Question 4:

A class A transformer coupled power amplifier has zero signal collector current of 50 mA. If the collector supply voltage is 5 V, find (i) the maximum a.c. power output (ii) the power rating of transistor (iii) the maximum efficiency.

Question 5:

Find the value of resistor R_2 to provide trickle current for distortion free output in the push-pull amplifier shown in the following figure. V_{BE} for each transistor is 0.7V.



Question 6:

A C-class amplifier shown below, the operating frequency is 3 MHz and $V_{CE(sat)}$ is 0.3V. Calculate the efficiency. If the peak current is 500 mA, find the conduction angle.