

# power Amplifiers

Q<sub>1</sub> A class-A transformer-coupled power amplifier is supplied from 20V d.c source and biased at  $I_{CQ} = 150 \text{ mA}$ . If the load is  $5 \Omega$  and the silicon transistor has  $\beta = 80$ .

- (i) Draw the circuit diagram and the voltage and current waveform for maximum o/p power.
- (ii) Calculate the turn-ratio  $\left(\frac{N_1}{N_2}\right)$  for max. efficiency
- (iii) Find the required value of  $R_B$ .

\* Q<sub>2</sub> A class-B transformer-coupled push-pull power amplifier is powered from 80V D.C source. The load is  $16 \Omega$  connected through a transformer of  $(N_1 = N_2)$ .

- (i) Draw the circuit diagram and the waveform of collector voltage and current for maximum o/p power cases using D.C & A.C Load-line.
- (ii) Find  $P_i(\text{d.c.})$ ,  $P_o(\text{a.c.})$ ,  $\%$ , power dissipated in each transistor.

Q<sub>3</sub> A complementary class-B output stage with  $R_L = 4 \Omega$ ,  $V_{CC} = 6 \text{ V}$ . If the input signal produced ~~a sinusoidal~~ a sinusoidal output voltage of peak value of 4.5V.

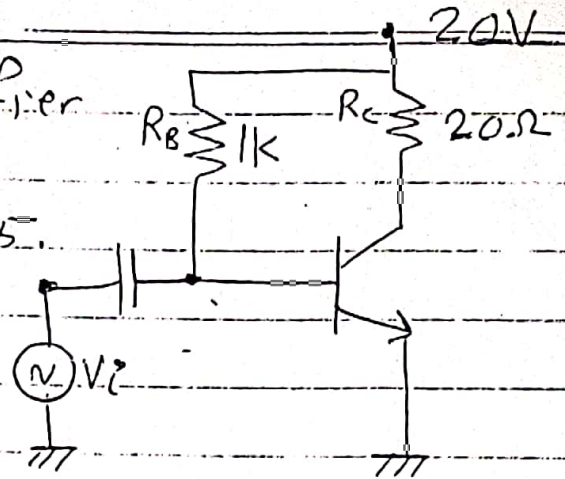
- (i) Draw the cct. diagram, sketch the A.C. L.L with voltage and current waveform.
- (ii) Find the load power, d.c input power,  $\%$  and power dissipated in each transistor.

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Q4: For the power Amplifier shown in Fig, the

Si transistor has  $\beta = 25$ .

If the input signal drives a peak base current of  $16 \text{ mA}$ .



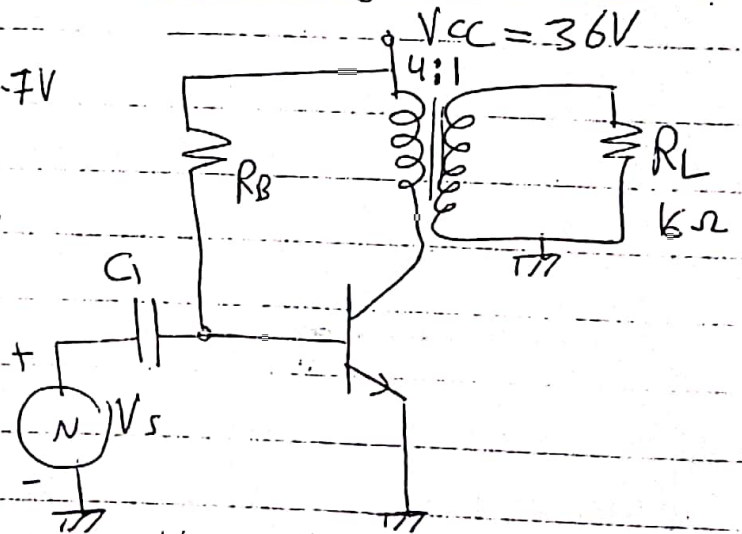
- (i) Draw d.c. & A.c. load-lines with Collector Voltage and current waveforms.
- (ii) Calculate d.c. input power, A.c. o/p power, Conversion efficiency  $\%$ , power dissipated in transistor and power dissipated in load.
- (iii) What must be the value of  $R_B$  which gives maximum undistorted output signal.

Q5: Given  $\beta = 50$ ,  $V_{BE} = 0.7 \text{ V}$  and the input voltage produces a load voltage of  $8 \text{ V}$  peak.

- 1) Calculate  $P_{o(a.c.)}$ ,  $P_{i(d.c.)}$  &  $P_D$  (assume ideal transformer).

2) Find  $R_B$ .

3) Sketch A.c. and D.c. L.L. with Collector Voltage and Current Swings.



Q6: Design a class-C power Amp. to deliver  $4 \text{ W}$  to a total effective load of  $50 \Omega$ . The input signal has a frequency of  $200 \text{ kHz}$ .

Draw the cct diagram and Calculate  $V_{CC}$ ,  $L$  and  $C$  of the tuned cct.