

Principles of electronic design (52431A)

Exam 16.04.2004

1. In the transistor amplifier shown in figure 1:
 - a) What are the collector current I_C and the base current I_B ?
 - b) Calculate the small signal parameters g_m and r_π – based on these parameters, draw the small signal model of the amplifier (you need not to take the output resistance r_o of the transistor into consideration).
 - c) What is the small signal gain v_{out}/v_{in} ?
2. Principles of AD/DA conversion.
 - a) How does a S/H circuit operate and why is it used?
 - b) Quantization: what does it mean and how does it relate to the concept of quantization noise?
 - c) Binary weighted DA converter: how do you represent an analogue voltage between 0 and 1.0 V using a 8-bit binary number?
3. Draw a non-inverting operational amplifier circuit with voltage amplification of 40 dB and the upper frequency limit of 10 kHz. The input impedance of the circuit should be 10 k Ω .
4. The parameters of the zener-diode in figure 2 are as follows: $U_Z = 8.2$ V, $I_{ZT} = 20$ mA, $P_{Zmax} = 1$ W. What is the minimum value for the current limiting resistor? What is the output voltage (U_{OUT}) if the zener diode is forward biased?

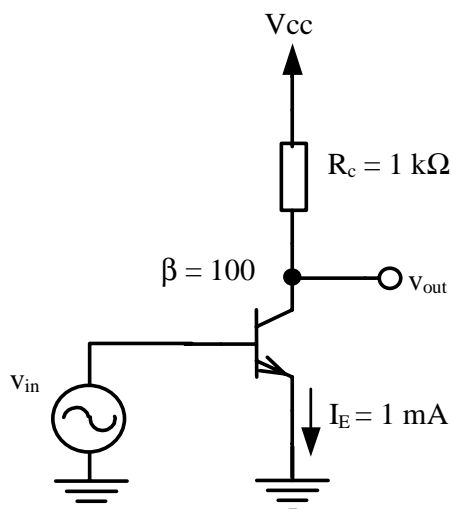


Figure 1.

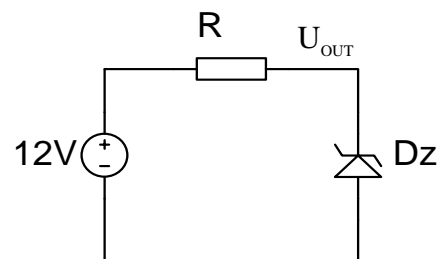


Figure 2.