Concordia University
Department of Electrical and Computer Engineering

Mid-term Test #1
13:10 - 14:10, Friday, Oct.12, 2001

Electronics I (ELEC 311), Sections U and W
Instructors: Drs. M. O. Ahmad and C. Wang

No materials allowed
Students are allowed to use silent, non-programmable electronic calculators without text display.
Attempt both questions.
Show all steps clearly in neat and legible handwriting.
Students are required to return question paper together with exam booklet(s).

Number of pages: 2

1. An amplifier has the following characteristics:

(i) When an input signal $v_s = 11\ \mu V$ with an internal resistance $R_S = 100\ k\Omega$ is applied to the amplifier input, it draws a current of $i_i = 10^{-5}\ \mu A$.

(ii) With this input voltage, the output voltage is $v_o = 10$ V under open-circuit (i.e., $R_L = \infty$), and $v_o = 9$ V with the load resistance $R_L = 90\ k\Omega$.

(a) Compute the overall voltage gain v_o/v_s, and the current gain i_o/i_i in dBs.

(b) Find the values of the parameters R_i, R_o and A_{vo} of the equivalent voltage amplifier of the circuit. Draw this equivalent voltage amplifier of the circuit with all the parameter values shown.

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2. A square wave voltage v_S shown in Figure 2(a) is applied to the circuit of Figure 2(b). Assume that the diode is ideal and R = 100 Ω.

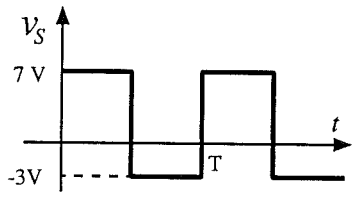
(a) Find and draw the waveform of the output voltage v_O.

(b) Find the peak forward current and the peak inverse voltage of the diode.

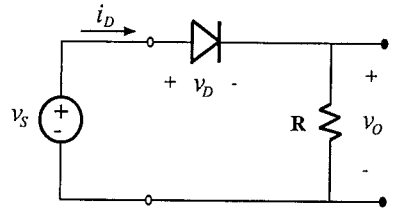
(c) What is the average value of the output voltage.

(d) Now the circuit is modified as shown in Figure 2(**c**). Find and draw the waveform of the output voltage v_O of this modified circuit.

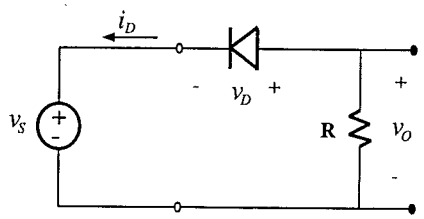
(e) Now assume that the diode in the circuit of Figure 2(**b**) is not ideal. Using a piecewise linear model with V_{DO} = 0.6 V, r_D = 60 Ω, find the peak forward current for the diode of this circuit.



(a)



(b)



(c)

Figure 2

Concordia University
Department of Electrical and Computer Engineering

Mid-term Test #2
13:10 - 14:10, Friday, Nov. 16, 2001

Electronics I (ELEC 311), Sections U and W
Instructors: Drs. M. O. Ahmad and C. Wang

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Number of pages: 2

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1. For the BJT circuit shown in Figure 1, $\beta = 99$, $V_A = 99$ V, $R_B = 100$ kΩ, $R_C = 2$ kΩ, and $V_{CC} = 5$ V.

(a) Find the dc value of V_E.

(b) Find the values of the small-signal parameters g_m, r_π, r_e, and r_o.

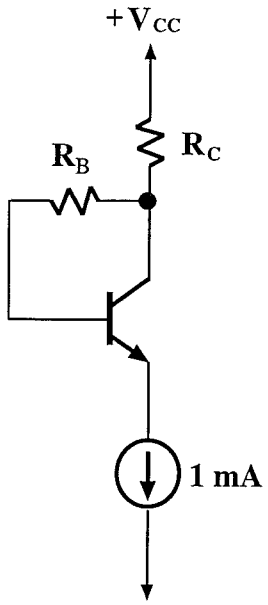

Figure 1

(Please turn over to Page 2)

2. Assume that the BJT of the circuit shown in Figure 2 is operating in the active region and that $V_A = \infty$. Derive expressions for the following items.

   (a) The input resistance R_i.

   (b) The overall voltage gain v_o/v_s.

   (c) The output resistance R_o.

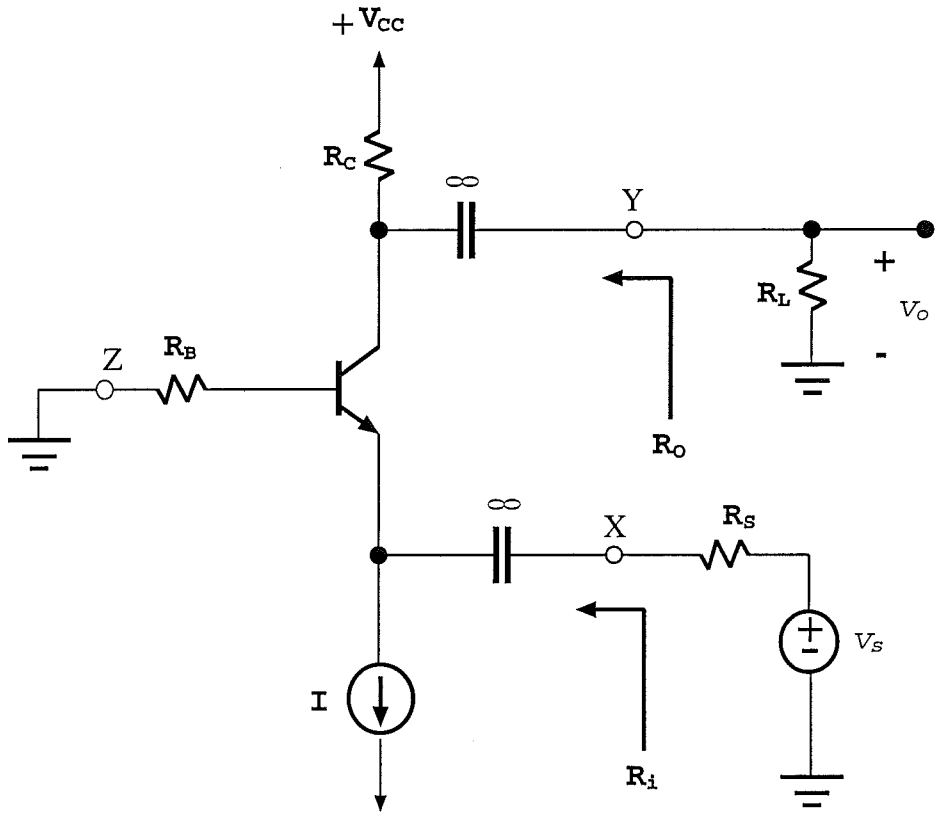

Figure 2