

ECE-255
Exam II
October 17, 2013

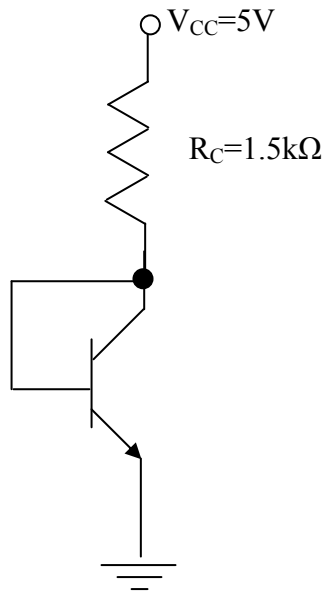
Name: _____
(Please print clearly)

Student ID: _____

INSTRUCTIONS

- This is a closed book, closed notes exam.
- Clearly mark your multiple choice answers in the test booklet.
- When the exam ends, all writing is to stop. This is not negotiable. No writing while turning in the exam/scantron or risk an F in the exam.
- All students are expected to abide by the customary ethical standards of the university, i.e., your answers must reflect only your own knowledge and reasoning ability. As a reminder, at the very minimum, cheating will result in a zero on the exam and possibly an F in the course.
- Communicating with any of your classmates, in any language, by any means, for any reason, at any time between the official start of the exam and the official end of the exam is grounds for immediate ejection from the exam site and loss of all credit for this exercise.

1) For the bipolar circuit shown below, I_B ?
 $\beta=100$, $V_{BE(on)}=0.7V$



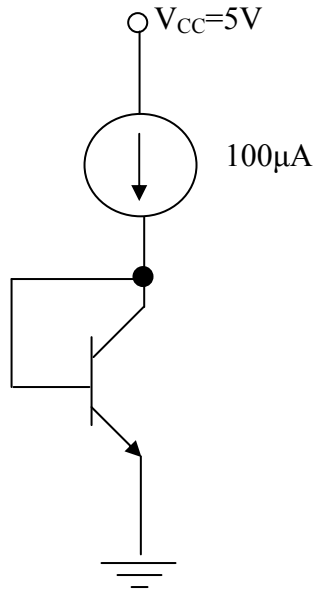
- (1) 1.2mA
- (5) 2.84 μ A

- (2) 28.4 μ A**
- (6) None of the above

(3) 2.87mA

(4) 2.5 μ A

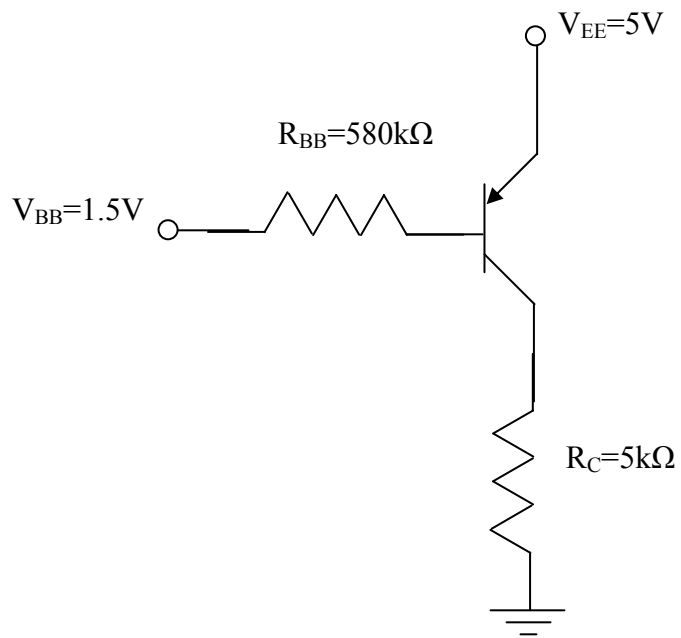
2) For the diode connected bipolar transistor shown below, $V_{BE}=?$
 $\beta=100$, $I_s=10^{-14}A$, and $V_T=25mV$



- (1) 5V (2) 0.7V (3) 0V (4) -0.6V
(5) 0.575V (6) None of the above

3) For the bipolar circuit shown below, $I_C=?$

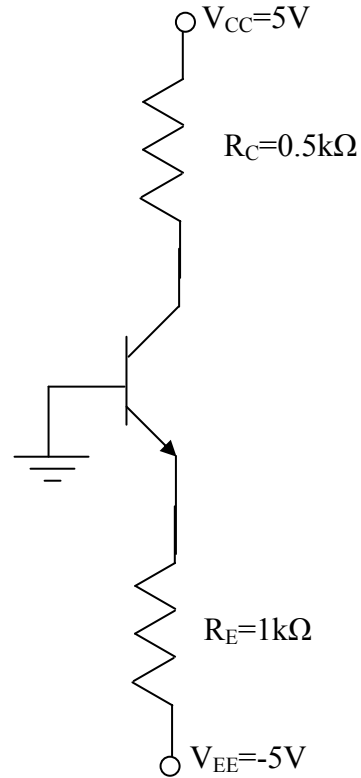
$\beta=100$, $V_{EB(on)}=0.7V$



- (1) 0.91A
- (2) 0.72mA
- (3) **0.48mA**
- (4) 0.8mA
- (5) 1.24mA
- (6) None of the above

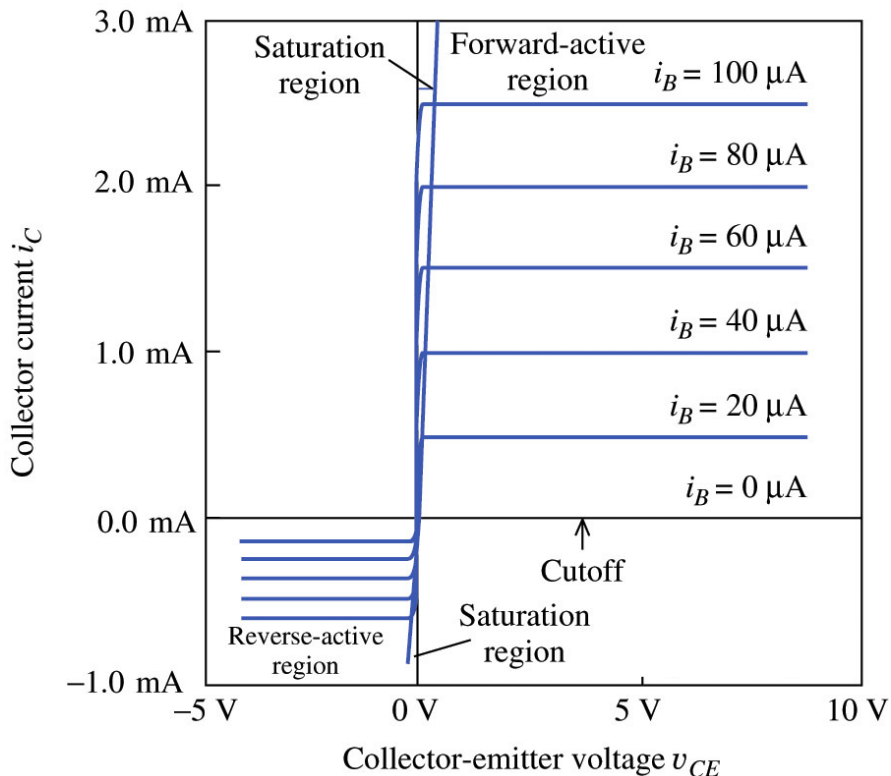
4) For the bipolar circuit shown below, $V_{CE}=?$

$\beta=100$, $V_{BE(on)}=0.7V$, Assume $I_C \approx I_E$



- (1) 7.85V (2) 5.7V (3) **3.55V** (4) 1.45V
(5) 5.15V (6) None of the above

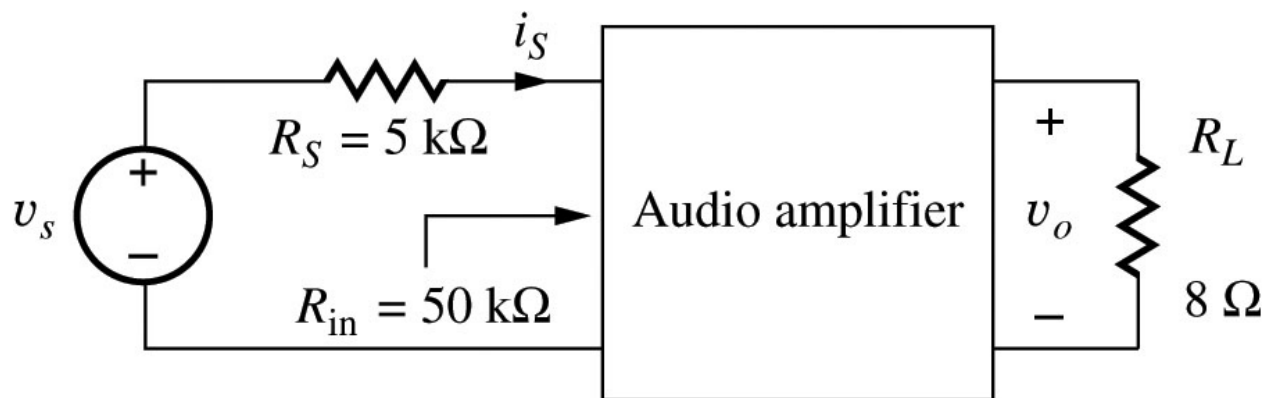
5) The following plot shows i_C versus v_{CE} of a BJT. What is the absolute value of β_F and β_R of this BJT? What is the Early voltage (V_A)?



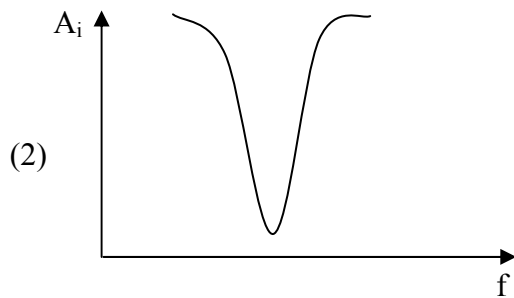
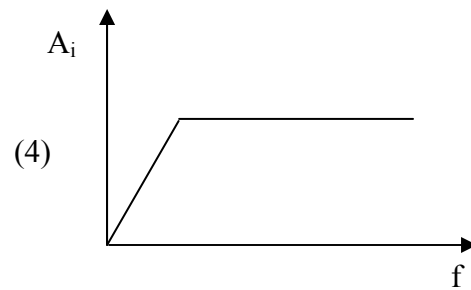
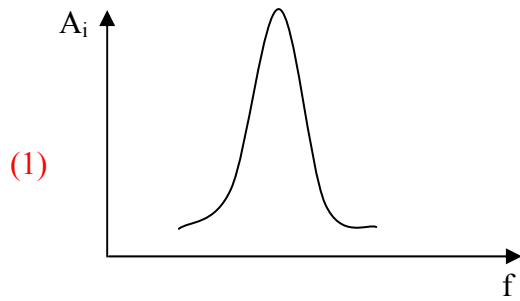
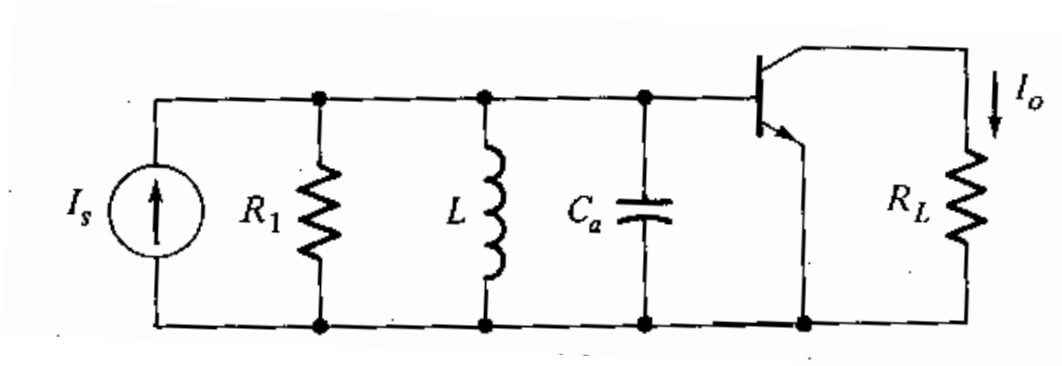
- (1) $\beta_F \approx 5$ and $\beta_R \approx 5$; positive 0.05V
- (2) $\beta_F \approx 10$ and $\beta_R \approx 2$; positive 0.05V
- (3) $\beta_F \approx 25$ and $\beta_R \approx 25$; negative infinite
- (4) $\beta_F \approx 25$ and $\beta_R \approx 5$; negative 0.05V
- (5) $\beta_F \approx 25$ and $\beta_R \approx 5$; negative infinite**
- (6) $\beta_F \approx 5$ and $\beta_R \approx 25$; negative 0.05V

6) What are the voltage gain in dB required of the amplifier below if $v_s=44$ mV, $R_s=5$ k Ω , and the output power is 10 mW? Use $P=2R_L v_o^2$

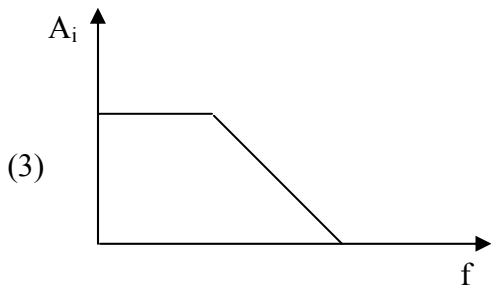
- (1) 5 dB
- (2) 10 dB
- (3) 20 dB
- (4) 30 dB
- (5) 35 dB
- (6) 55 dB



7) Which one of the current gain (A_i) frequency response curves belong to the amplifier shown below?

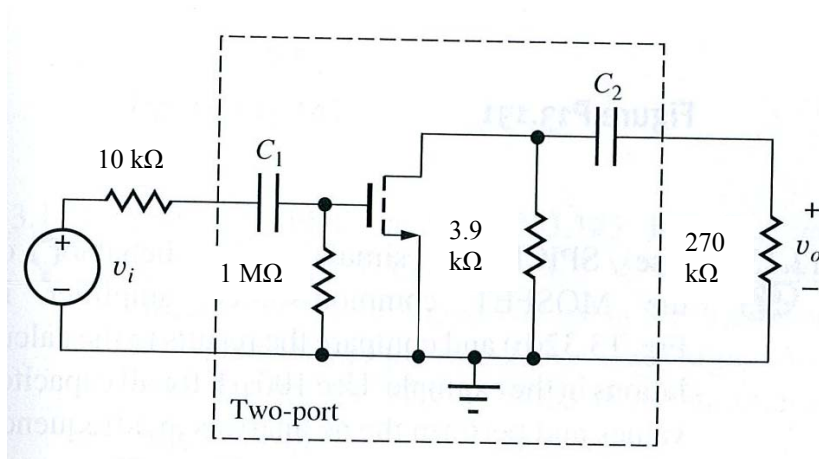


(5) Circuit cannot provide any current gain



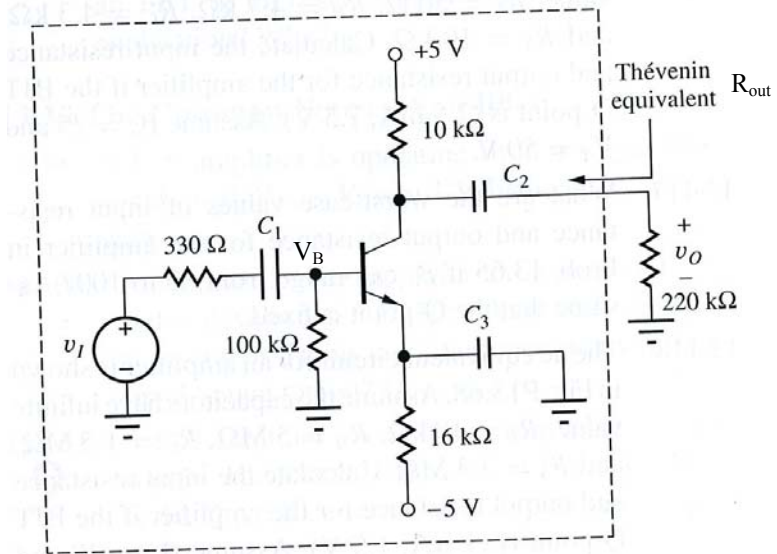
(6) None of the above

8) What is the voltage gain V_o/V_{in} for the common source amplifier shown below? Assume $K_n=1 \text{ mA/V}^2$ and $\lambda=0.015 \text{ V}^{-1}$. The bias points are $I_D=2 \text{ mA}$ and $V_{DS}=7.5 \text{ V}$



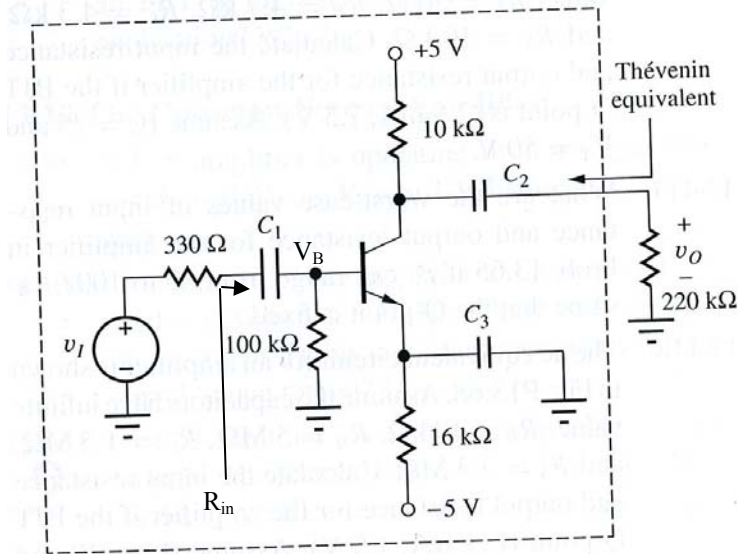
- (1) -0.98 (2) -540 (3) -6.8 (4) -25
 (5) -5.0 (6) None of the above

9) What is the Thevenin equivalent output impedance (R_{out}) of the following common emitter amplifier seen at the location shown below? Assume $\beta=65$ and $V_A=\infty$



- (1) ∞
- (2) 0
- (3) $9.56\text{k}\Omega$
- (4) $220\text{k}\Omega$
- (5) **$10\text{k}\Omega$**
- (6) None of the above

10) What is the input resistance (R_{in}) of the following common emitter amplifier seen at the location shown below? Assume $\beta=65$ and $V_A=\infty$ and $V_{BE(on)}=0.7V$ and $V_T=25mV$



- (1) 100k Ω
- (2) 6.8k Ω
- (3) 6.3 Ω
- (4) 13.6k Ω
- (5) 6.3k Ω**
- (6) None of the above