King Fahd University of Petroleum & Minerals
Electrical Engineering Department
Fall 2011 (102)

EE 203 – Exam II
Wednesday, May 4, 2011
6:30-8:00 PM

Name	
ID	

	Dr. Oualid	Dr. Al-Gahtani	Dr. Al-Zaher	Dr. Wessam
Section	1 , 2	3, 6	4 , 5	7 , 8

Problem	Grade
1 (40 points)	
2 (30 points)	
3 (30 points)	
Total (100 points)	

Question 1 – Part A:

a) For the common source amplifier shown in Fig. 1 (a), assuming $\lambda = 0$,

    1. Find the required value for g_m to obtain gain of $-10V/V$.

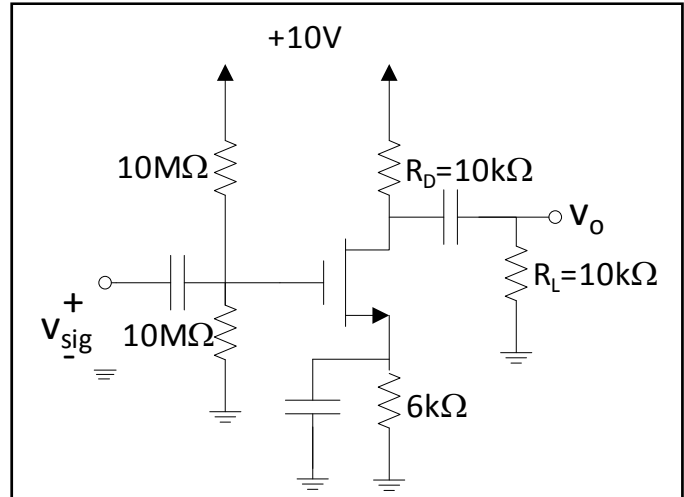   2. Determine the input and output resistances.

Fig. 1. (a)

Question 1 – Part B:

b) It is required to use the core circuit shown Fig.1 (b) to design a **common drain amplifier (source follower)** without changing the DC operating point. The input ac source has a source resistance of $R_{sig}=50k\Omega$ and the load is supposed to be $R_L=4k\Omega$.

1. Draw the complete amplifier circuit.
2. Draw the ac small-signal equivalent circuit using the T-model. (Neglect channel length modulation i.e. $\lambda = 0$)
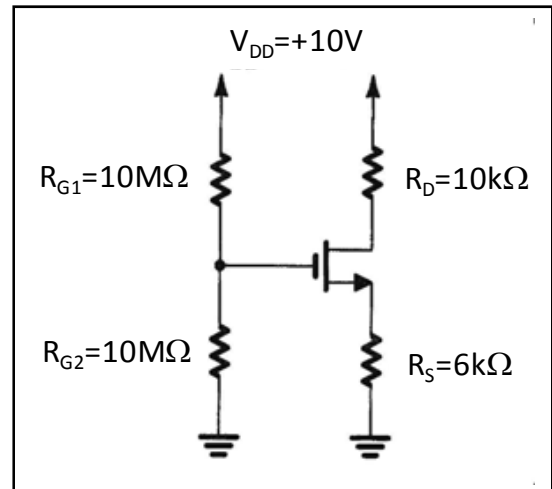3. Find the expression of the amplifier's voltage gain.

$V_{DD}=+10V$

$R_{G1}=10M\Omega$

$R_D=10k\Omega$

$R_{G2}=10M\Omega$

$R_S=6k\Omega$

Fig. 1. (b)

Question 2 – Part A:

a) For the circuit shown in Fig. 2. (a), assume $\beta=74$ and $V_{EB}=0.7V$, calculate I_E, I_B, I_C, V_E, V_B, V_C. (Verify any assumption you make about the operating mode of the transistor).
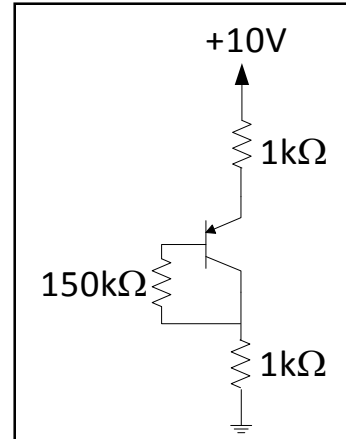

Fig. 2. (a)

Question 2 – Part B:

b) For the circuit shown in Fig. 2. (b), $\beta=100$, and $V_{BE}=0.7V$. Assuming that the transistor is operating in the saturation mode: ($V_{CEsat}=0.2V$),

1. Find the values of I_E, I_B, I_C, V_E, V_B, V_C.
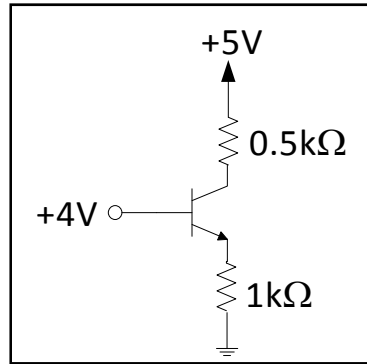
2. Verify the assumption.

Fig. 2. (b)

Question 3:

For the common-base amplifier shown in Fig. 3, dc current I_E=0.5mA (given). Assume β=100 and Early voltage V_A is infinity, calculate:

a) The overall voltage-gain.

b) The amplifier's input-resistance.

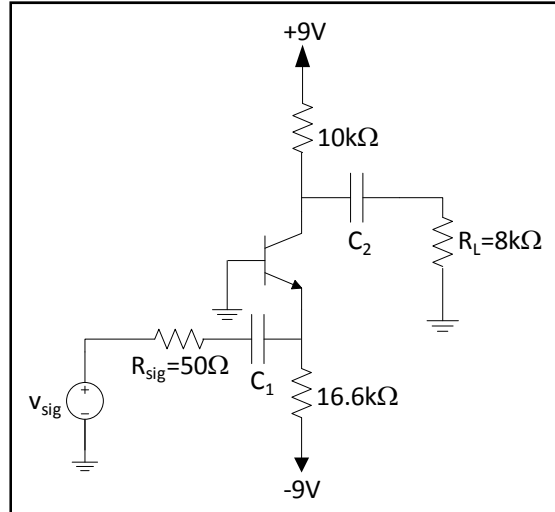c) The amplifier's output resistance.

Fig. 3.