系所類別	科目	節次	准考證號碼(考生請填入)	考試日期
電機工程系碩士班（電機組）	電子學	第二節		99/5/2

※答案須寫在答案卷內，否則不予計分。

1. Determine the current I_D and the diode voltage V_D for the circuit shown in Fig. 1 with V_{DD}=5V and R=2kΩ. Assume that the diode piecewise-linear model parameters are V_{D0}=0.65V and r_D=10Ω. (10%)

2. For the circuit shown in Fig. 2, assume that the input signal $v_i(t)$=5sin(2π 50t) and the diode forward voltage drop V_D=0.7V. Plot the waveforms of $v_i(t)$ and $v_o(t)$ for $0 \leqq t \leqq 1/50$. (15%)

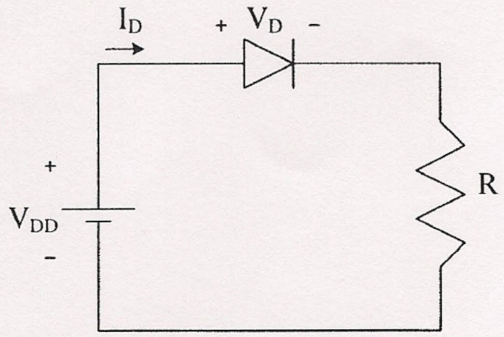

Fig. 1

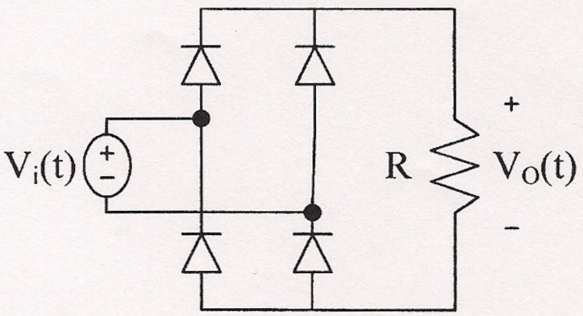

Fig. 2

3. Consider the Common Emitter amplifier in Fig. 3 when the transistor is properly biased in the active region and has the following small signal parameters β=100, g_m=40mA/V, r_π=2.5kΩ, and r_o=100kΩ. If R_B=100kΩ, R_{sig}=5kΩ, R_L=5kΩ, and R_C=8kΩ. Find the overall voltage gain $A_v=v_o/v_{sig}$. (15%)

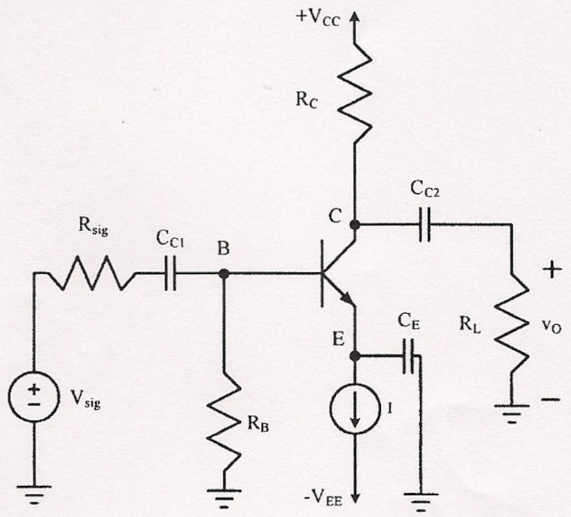

Fig. 3

系所類別	科目	節次	准考證號碼(考生請填入)	考試日期
電機工程系碩士班（電機組）	電子學	第二節		99/5/2

4. The Common Source amplifier shown in Fig. 4 is connected to a signal source v_{sig} with R_{sig}=100kΩ and a load resistance R_L=15kΩ. Assume that the NMOSFET is properly biased in the saturation region and has the following parameters g_m=1mA/V and r_o=150kΩ. Find the overall voltage gain $A_v=v_o/v_{sig}$. (15%)

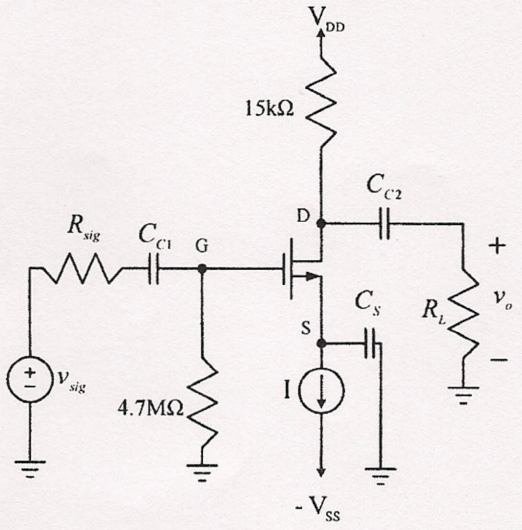

Fig. 4

5. According to the circuit shown in Fig. 5, the NMOSFET with V_t=1.5V and $(\mu_n C_{ox})(W/L)$=1mA/V^2。Analyze the circuit to find V_{GS}, V_D and V_S. (15%)

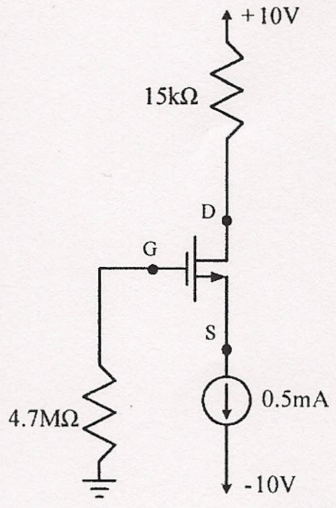

Fig. 5

系所類別	科目	節次	准考證號碼 (考生請填入)	考試 日期
電機工程系碩士班（電機組）	電子學	第二節		99/5/2

6. Consider the circuit shown in Fig. 6. Assume that the operational amplifier is ideal. Derive the voltage gain $A_v=v_o/v_I$. (15%)

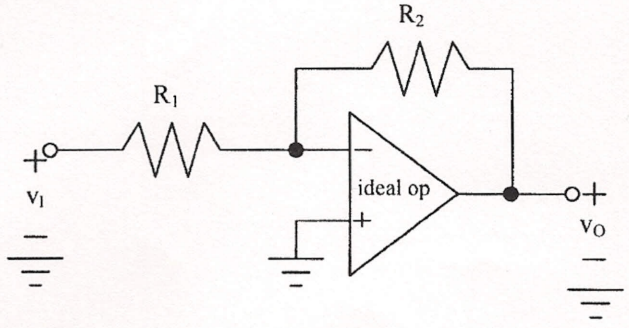

Fig. 6

7. As reference to Fig. 7, use the superposition principle to express v_o in terms of v_1 and v_2. Assume that the operational amplifier is ideal. (15%)

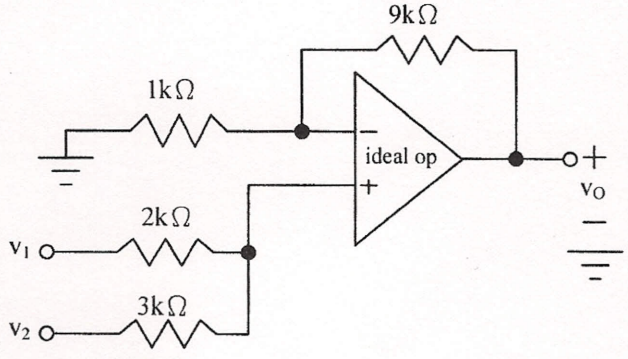

Fig. 7