INTERNATINONAL UNIVERSITY (IU) – VIETNAM NATIONAL UNIVERSITY – HCMC

Final Examination

Date: January 14th, 2016

Duration: 120 minutes

SUBJECT: Electronic Devices	
Dean of School of Electrical Engineering Signature: Full name: Tran Van Su	Lecturer: Tran Van Su, M.Eng. Signature: Full name: Tran Van Su

INTRODUCTIONS:

1. Only one NOTE of A4-PAPER allowed during the exam. Books, other materials, and computers are prohibited.
2. Answer all questions.

Question 1 (30 Marks)

The components and supply voltage of the following circuit are described as follows: V_{CC} = 12V, R_i = 200 Ω, R_1 = 2.2 KΩ, R_2 =18 KΩ, R_E = 600 Ω, R_C = 5.6 KΩ and β = 120. The early voltage is 50V.

a. Calculate the quiescent point of transistor Q. **(5 Marks)**
b. Plot the AC load line of the circuit. (**5 Marks**)
c. Find input impedance R_{in} and output impedance R_o. **(5 Marks)**
d. Find the voltage gain $A_v = v_0/v_i$. **(10 Marks)**
e. Find the current gain $A_i = i_0/i_i$. (**5 Marks**)

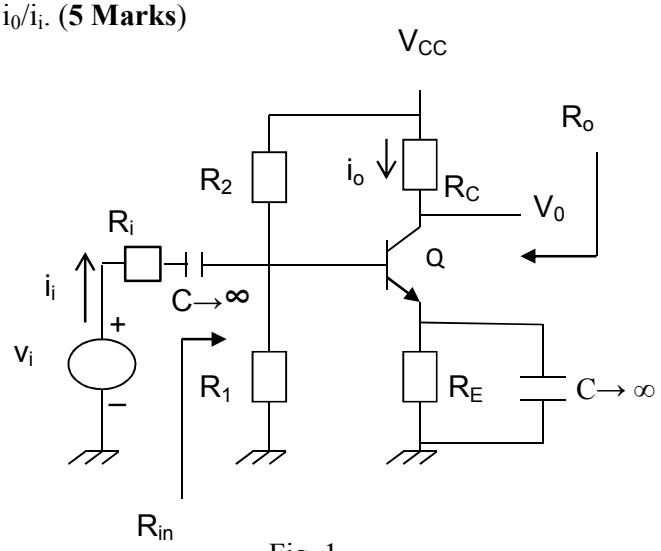

Fig. 1

Question 2 (25 Marks)

The circuit shown in Fig. 2 has V_{CC} = 10 V, R_b = 12KΩ, and β = 100. Neglect r_o.

a. Calculate the quiescent point of transistor Q. **(5 Marks)**
b. Sketch the AC small-signal equivalent circuit. **(5 Marks)**
c. Determine R_L to obtain the voltage gain $A_V = v_o/v_i$ = 0.9 (**5 Marks**)
d. Calculate input impedance R_{in}. **(5 Marks)**
e. Calculate output impedance R_o **(5 Marks)**

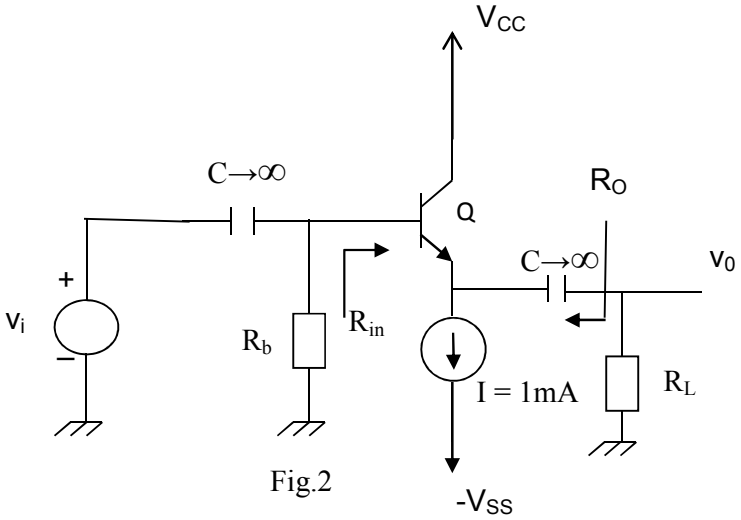

Fig.2

Question 3 (30 Marks)

V_{DD} = 12 V, R_G = 470 KΩ, R_{Sig} = 20 KΩ, V_t = 1V, and $\mu_n C_{ox} \frac{W}{L} = 1.2 \quad mA/V^2$. (Neglect r_o)

a. Compute V_{GS} and V_S. **(5 Marks)**
b. Plot the AC small-signal equivalent circuit. **(5 Marks)**
c. Determine $R_D//R_L$ to obtain $A_V = v_o/v_{sig}$ = - 1.5 (**10 Marks**)
d. If V_D = 5V. Find R_D and R_L. (**5 Marks**)
e. What are the input and output impedances R_{in} and R_o. **(5 Marks)**

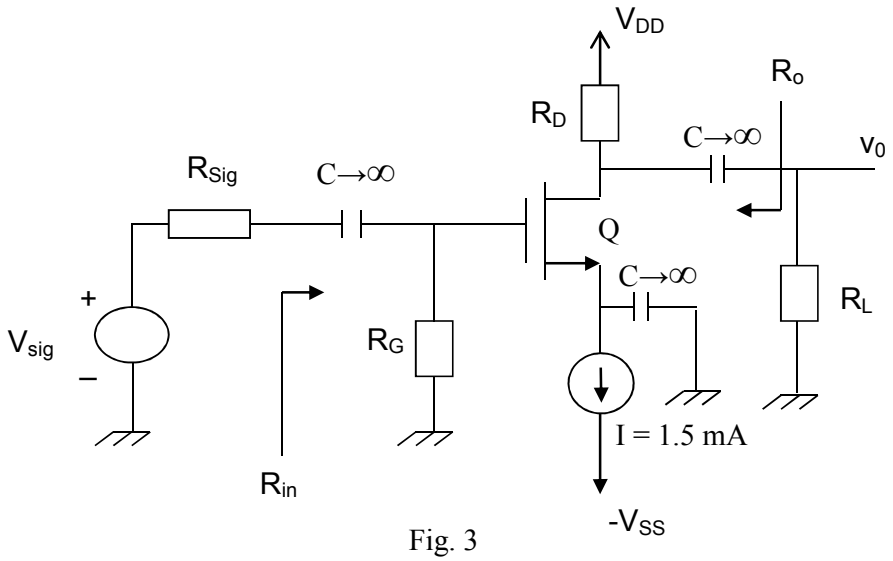

Fig. 3

Question 4 (15 Marks)

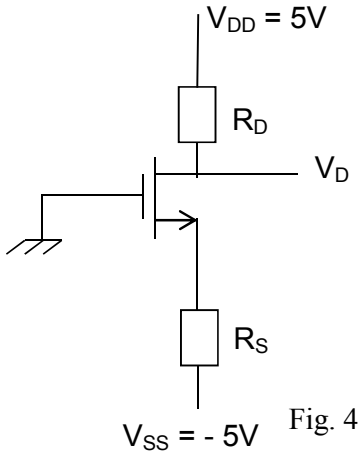

Fig. 4

The transistor in Fig. 4 has I_D = 1mA, V_D = 0V, V_t = 2V, $\mu_n C_{ox}$ = 20μA/V^2, L = 10μm, and W = 400μm. Determine R_S and R_D.(Transistor operates in saturation mode)