中原大學99學年度碩士班入學考試

可使用計算機，惟僅限不具可程式及多重記憶者

（1）Please derive the input resistance of the following OP amplifier, assuming the finite open-loop gain is **A**. (10%)

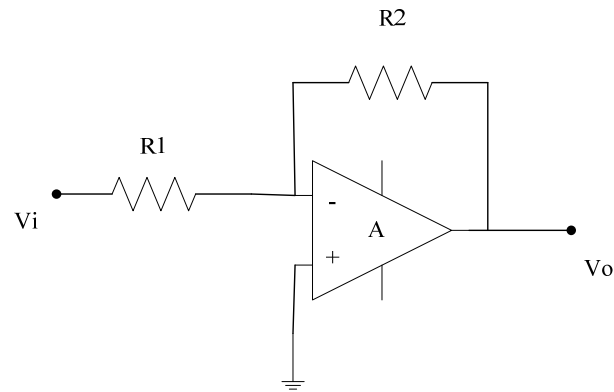figure 1

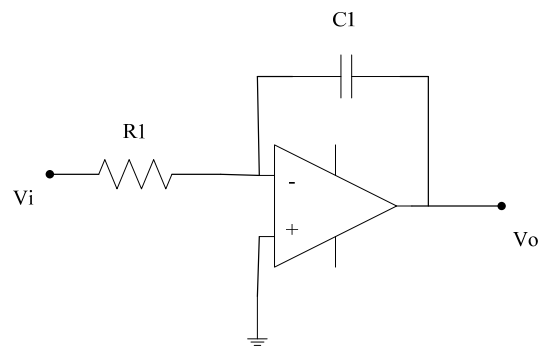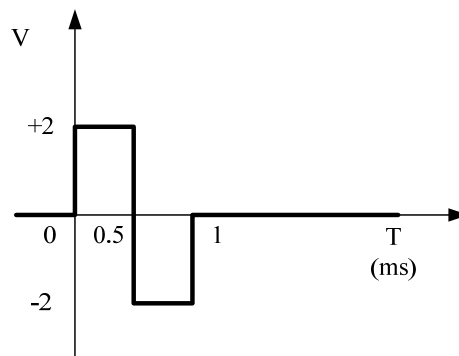（2）What is the name of the following circuit, as shown figure 2? （5%）

figure 2

（3）Assuming the time constant is 1ms, Please derive all the necessary equations and draw the output waveform of the circuit in figure 2 based on the following input signal.(15%)

(4) The parameters of the transistor shown in figure 3 are:

$\beta = 100$, $V_A = 80v$. Assuming the values of all capacitors are infinite, Please find:

  A. The dc voltage of collector, base and emitter.(15%)

  B. What is the g_m? r_π?(10%)

  C. Assuming A is connected to ground, B is attached to a load resistance of 10k ohm, and C is connected to a voltage source V_s with 200ohm source resistance. What is the voltage gain of
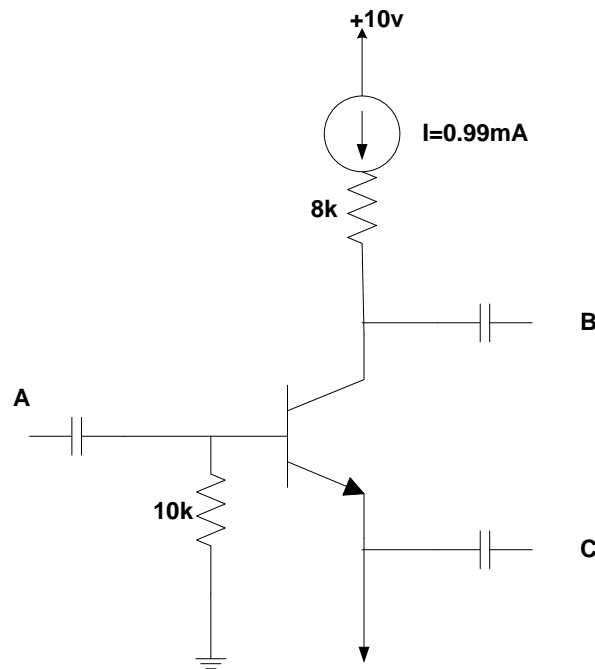
  $v_B \big/ v_s$? (20%)

figure 3

(5) Please draw a typical **CMOS** inverter using **n** and **p** channel devices (2.5%), Please explain noise margin (2.5%).

(6) Based on the above question, assuming the sizes of both **n** and **p** channel MOS are identical, and $\mu_n = 2\mu_p$, $|V_t| = 1v$, $V_{DD} = 5v$, what are the values of V_{IH}, V_{IL}? And noise margin?(20%)