明新科技大學 92 學年度研究所 □一般生 □在職生 招生入學考試命題紙（一）

科　　目	考試日期	節次	准考證號碼
電子電路	92 年 5 月 11 日	第 2 節	

1. Assuming the op amp to be ideal, derive an expression for the close-loop gain v_O / v_i of the circuit in Fig.1. Use this circuit to design an inverting amplifier with a gain of 100 and input resistance of 1MΩ. Assume that for practical reasons it is required not to use resistor greater than 1MΩ. (Find the resistance R_1, R_2, R_3, and R_4) (20%)

2. For the circuit in Fig.2 let R_B=100kΩ, R_E=10kΩ, R_C=10kΩ, V_{CC}=V_{EE}=10V, and let the BJT have β=100 and V_A=100V. (a) Find the values of V_B and I_C. (b)Find the values of the small signal model parameters g_m, r_π, r_e, and r_o at the bias point. (c)When connected in the common-emitter configuration with R_S= R_L =10kΩ. Find the values of R_i, R_o, A_v, A_i. (Where A_v ≡ v_o / v_s and A_i ≡ i_o / i_i) (20%)

3. Fig.3 shows an enhancement MOSFET amplifier in which the output signal at the drain is coupled to the load resistance R_L via large capacitor. We wish to analyze this amplifier circuit to determine its small-signal voltage gain v_o / v_i and its input resistance R_i. The transistor has V_t=1.5V, K=0.125mA/V^2, and V_A=50V. (Hint: V_t=V_p, K=I_{DSS}/V_p^2)(20%)

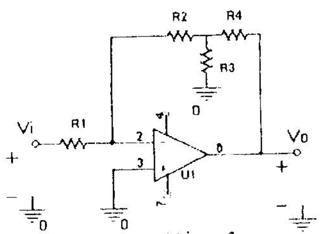

Fig 1

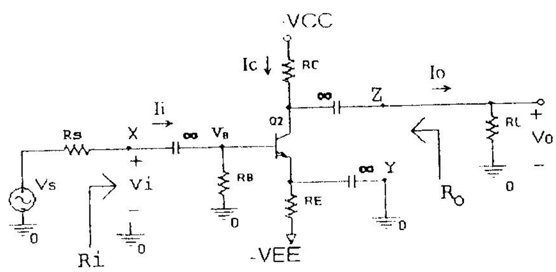

Fig 2

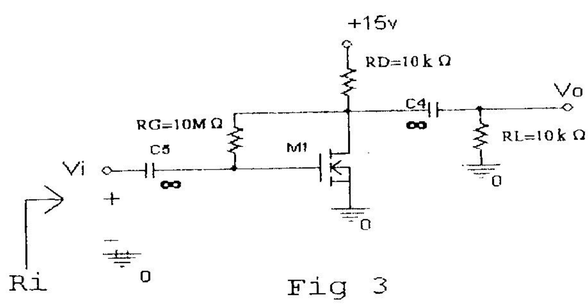

Fig 3

科　目	考試日期	節次	准考證號碼
電子電路	92年5月11日	第2節	

4. For the ideal class B push-pull amplifier (Q1-Q2) in the Fig 4,Vcc=20V,RL=8Ω The input is sinusoidal. a. Determine the maximum output signal power. (5%), b.Determine the conversion efficiency (5%), c. The gain of the OP amplifier A is 50, Vbe=0.7V, Sketch the transfer characteristic vo versus vi of the resulting feedback amplifier. (5%)

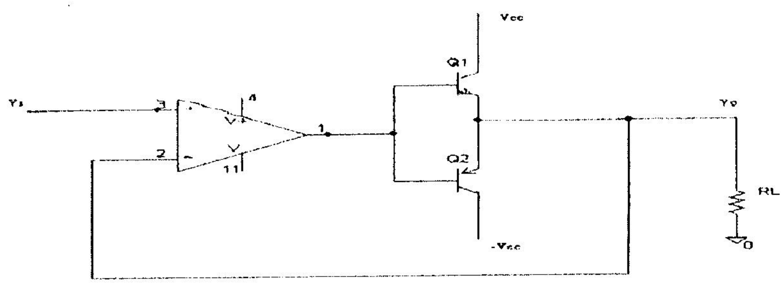

Fig. 4

5. a. Determine the frequency of the oscillation. (5%)

b. Find the amplifier gain needed to just make this circuit oscillate. (5%)

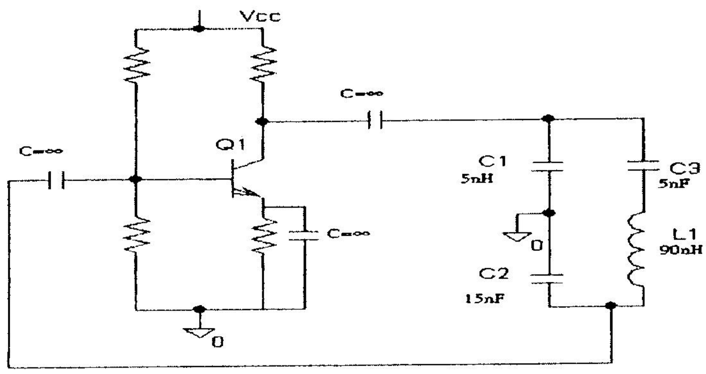

Fig. 5

6. Fig. 6a,6b are the first order active filters,R1=R2=10kΩ,C1=1μF

a. What type of the filter is for the circuit shown in Fig. 6a,6b. (5%)

b. Determine the transfer function vo/vi of the circuit by assuming the amplifier is an ideal OP amplifier. (10%)

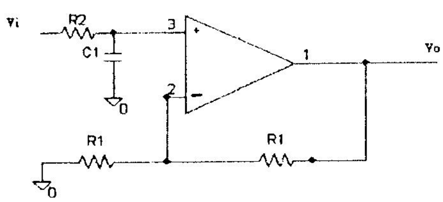

Fig 6a

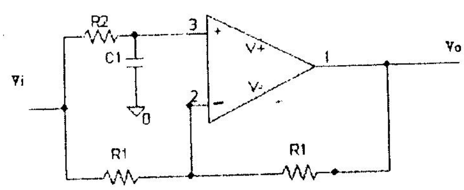

Fig. 6b