

國立臺北科技大學九十六學年度碩士班招生考試

系所組別：1111 機電整合研究所甲組

第二節 電子學 (選考) 試題

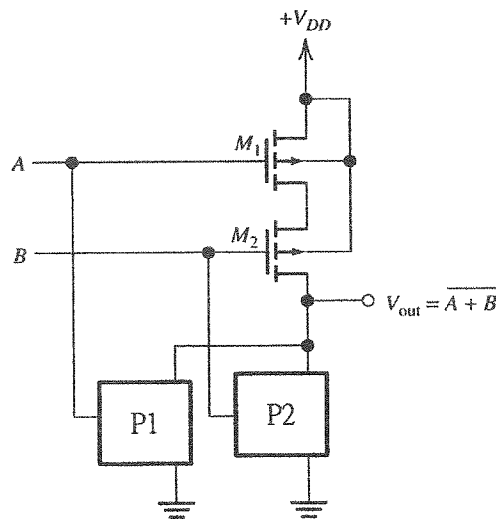
第一頁 共二頁

注意事項：

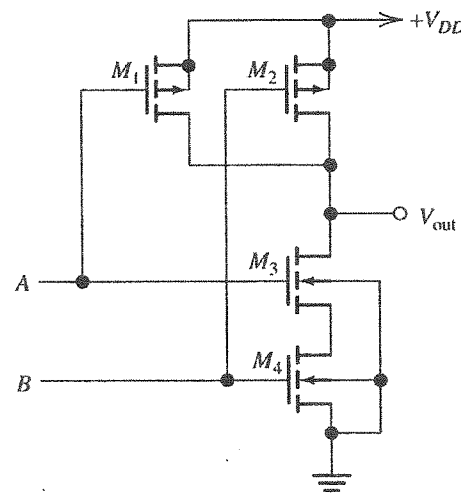
1. 本試題共 10 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. MOSFET is a basic and standard component in the logic circuit design.

- (A) To complete the design of a NOR-function circuit, add proper components in the block P1 and P2. 5%
- (B) Add additional MOSFET components to make the following circuit an AND-function logic circuit and explain how the transistors operate for various input signals. 5%



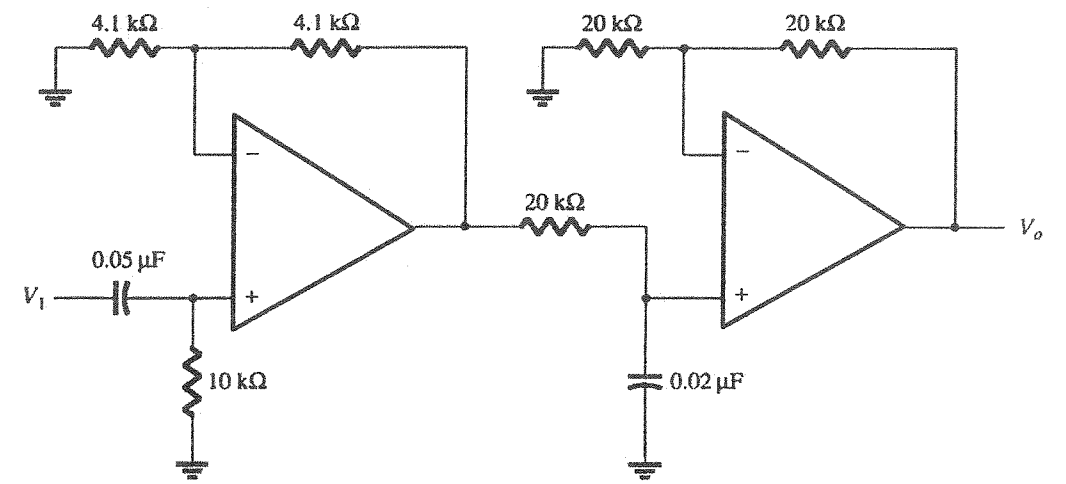
(A)



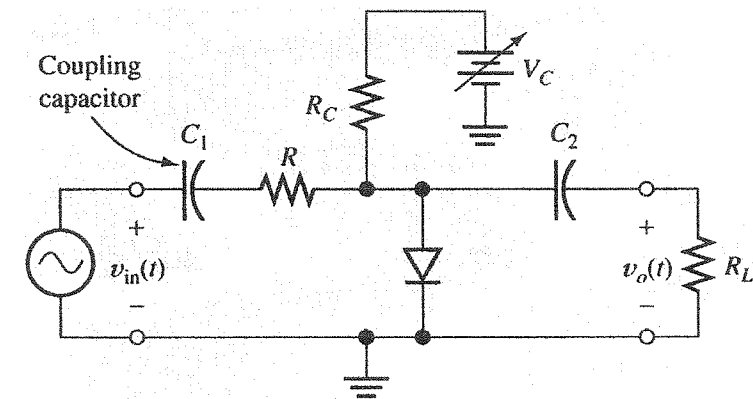
(B)

2. For the circuit shown,

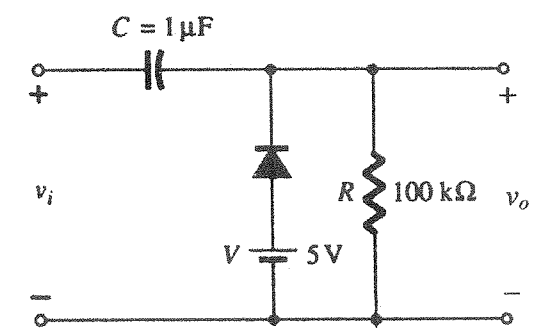
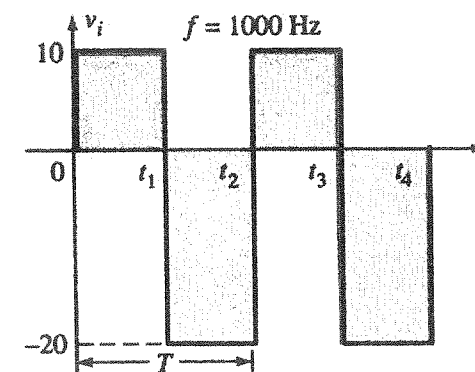
- (A) Select proper RLC components and use only 10 kΩ resistors in the blocks P1~P4 such that this circuit will have a band-pass filter function with corner frequencies at 318.3 and 397.9 Hz. 5%
- (B) What can be done if the filter gain within the passing frequency band has to be 2. 5%



3. For the circuit shown, in which $R=100 \Omega$, $R_c=2 \text{ k}\Omega$, and $R_L=2 \text{ k}\Omega$. If the emission coefficient of the diode $n=1$, operating temperature is 300 °K with a constant diode voltage of 0.6 V. Find the Q-point current and small signal amplification gain A_v for $V_c=1.6 \text{ V}$. 10%

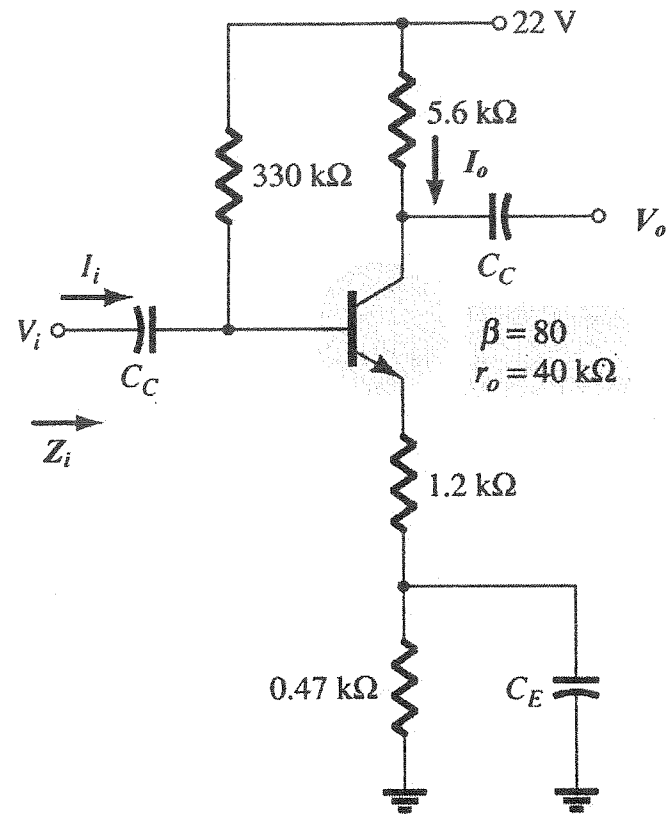


4. Draw and discuss the symbols, cross-sections chart and I-V curves of the *n-channel* JFET, depletion/enhancement MOSFETs and VMOS(4 kinds totally), as well as the differences among them. 10%
5. For the circuit shown, determine the maximum and minimum voltages of the v_o . Assume that diode voltage is negligible. 10%

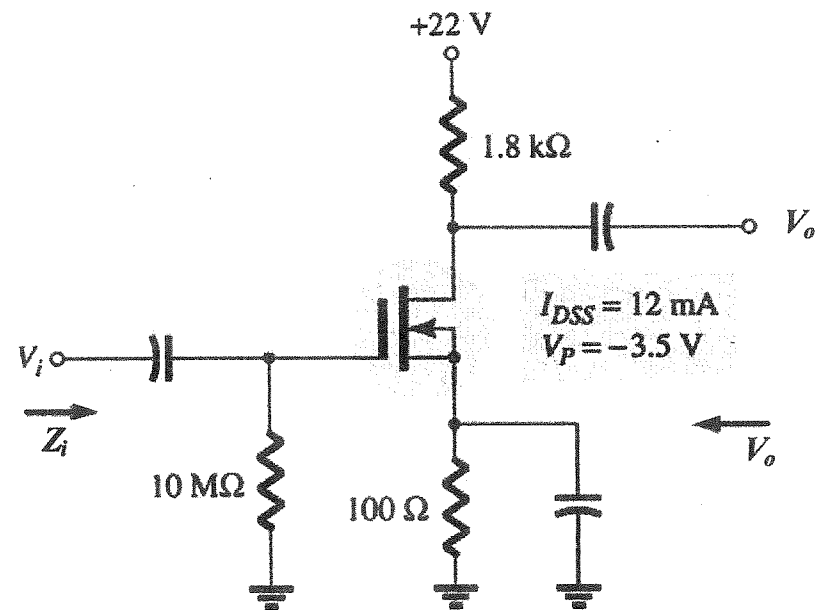


注意：背面尚有試題

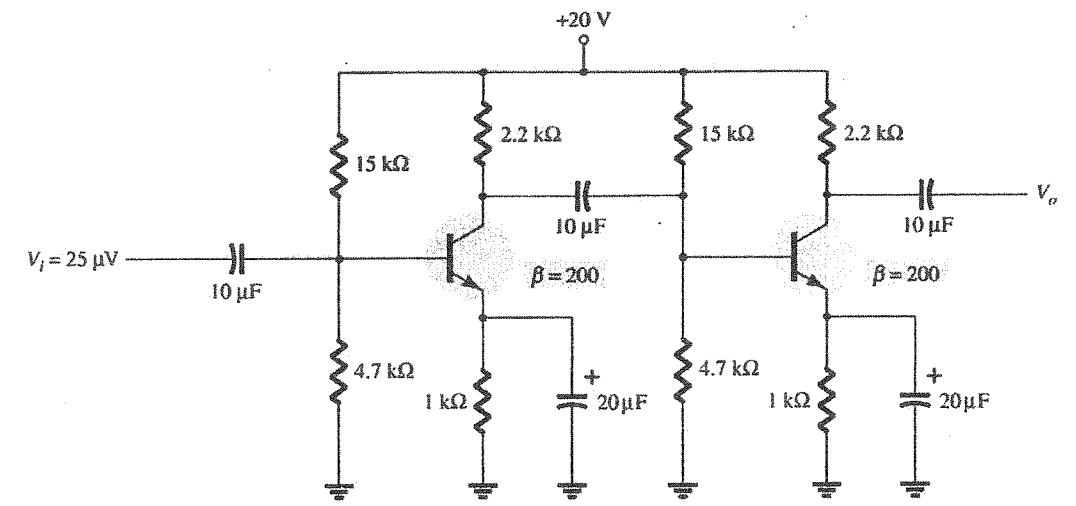
6. For the circuit shown, determine the r_e and the A_v . 10%



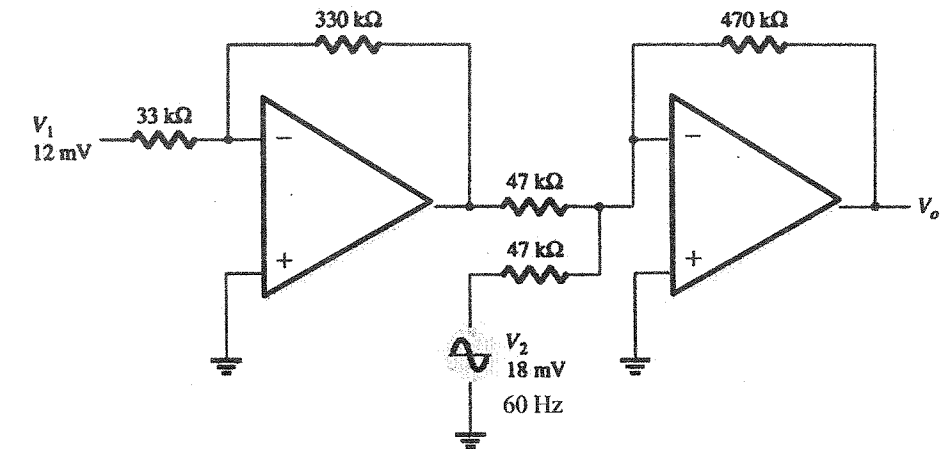
7. Determine the Z_i and A_v for the following circuit if $r_d = 60\text{ k}\Omega$. 10%



8. Calculate the voltage gain, A_v , of the following circuit if a $10\text{ k}\Omega$ resistor is connected to the output. 10%



9. Determine the output voltage of the following circuit. 10%



10. For the circuit shown,

- (A) Calculate the regulated output voltage V_o . 5%
- (B) Calculate the output voltage V_o if a load resistor of $10\text{ k}\Omega$ is added at the output end. 5%

