

國立臺北科技大學

九十三年度電腦通訊與控制研究所入學考試

電子學(丁組)試題

填准考證號碼

第一頁 共二頁

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注意事項：

1. 本試題共十題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. Design the operational amplifiers-based circuit with the following output (10%)
 $V_o = 5V_1 + 2V_2 + 3V_3$

2. Prove that Fig. 1 is the second-order bandpass filter. (10%)

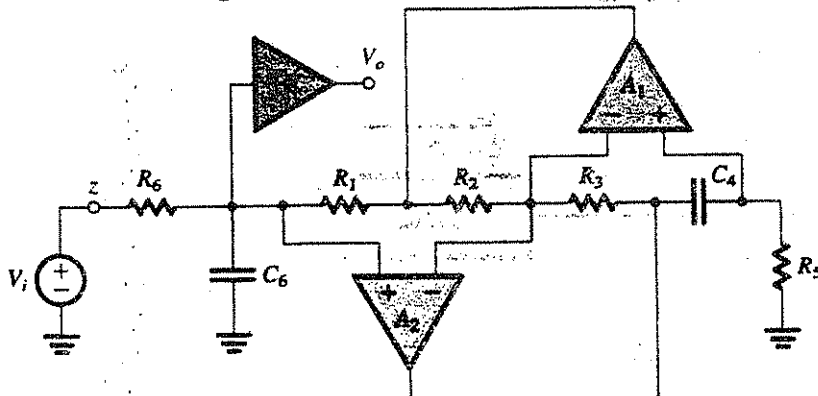


Fig. 1

5. In the Fig. 4, find the small-signal differential gain where the transconductances and output resistances of all MOS are equal to $g_m = 100 \mu\text{A/V}$ and $r_o = 2\text{M}\Omega$, respectively. (10%)

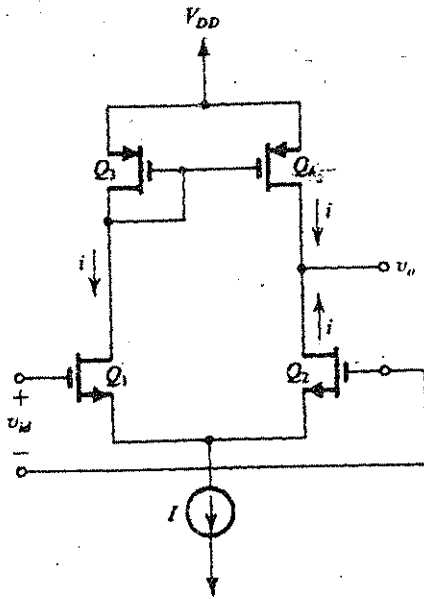


Fig. 4

6. What is the function of the circuit shown in the Fig. 5? Explain it clearly. (10%)

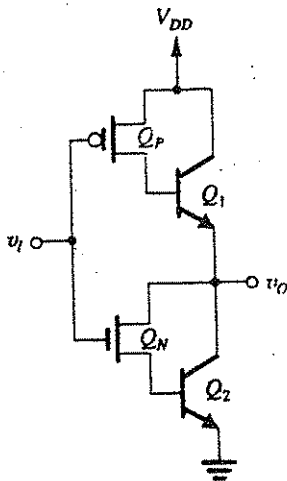


Fig. 5

7. The CMOS layout is shown in Fig. 6, sketch the corresponding CMOS circuit, where a and b are inputs, Out is output. (10%)

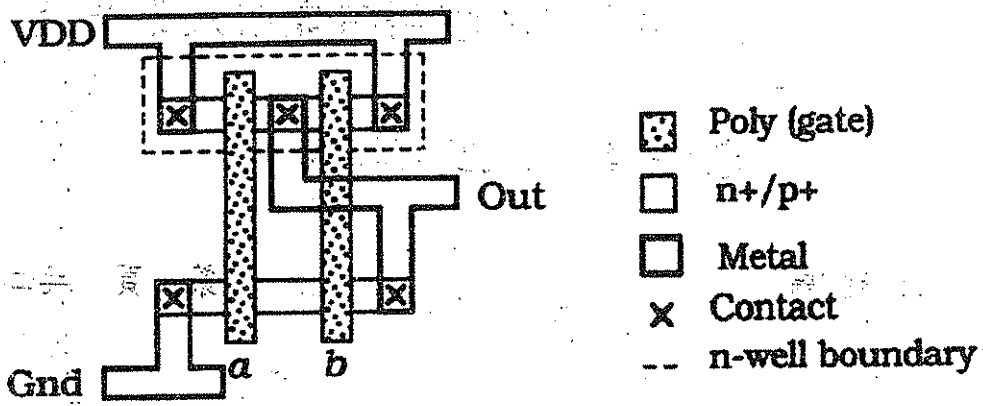


Fig. 6

8. Realize the Exclusive-OR function employing the CMOS pass-transistor logic with two inputs A and B and one output Y. (10%)

9. Sketch the five inverters-based ring oscillator and find the oscillation frequency if the inverter propagation delay is specified to be 1 nsec. (10%)

10. Explain the operation principle of Fig. 7 where DAC is the digital-to-analog converter. (10%)

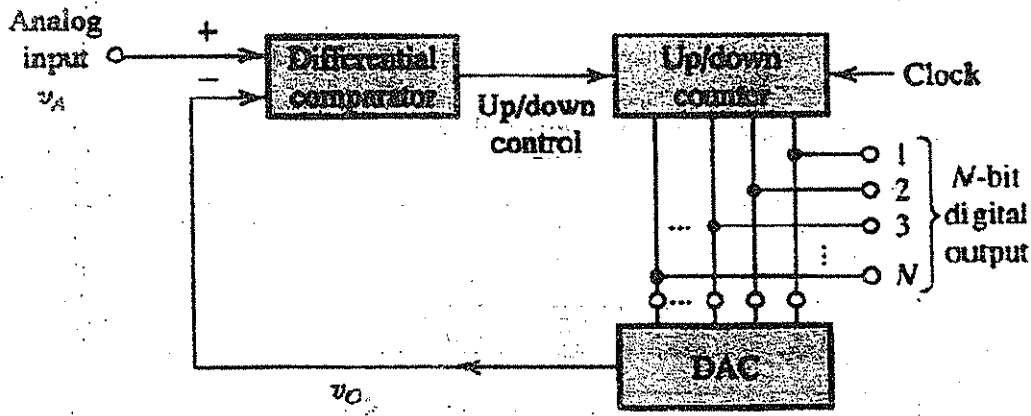


Fig. 7