題號： 253
科目：電子學(A)
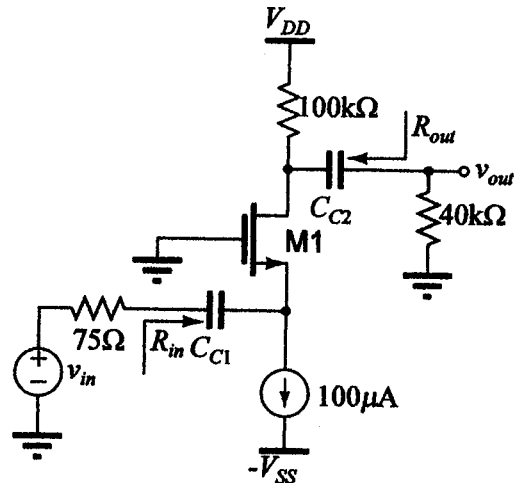節次： 2

國立臺灣大學 108 學年度碩士班招生考試試題

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1. (55%) For the following amplifier circuit, please

    (a) (10%) sketch the small-signal equivalent circuit,

    (b) (15%) find the transistor W/L ratio such that the input resistance R_{in} is matched (equals to 75Ω),

    (c) (15%) find the small-signal gain (v_{out}/v_{in}),

   (d) (15%) and find the output resistance R_{out}.

    [Assume $\mu_n C_{ox} = 120\,\mu A/V^2$, $V_{tn} = 0.7$ V, $V_{DD} = V_{SS} = 15$ V, and $\lambda_n = 0$.]

2. (15%) The following circuit is an active inductor; please derive the inductance L_{eq} with respect to frequency.
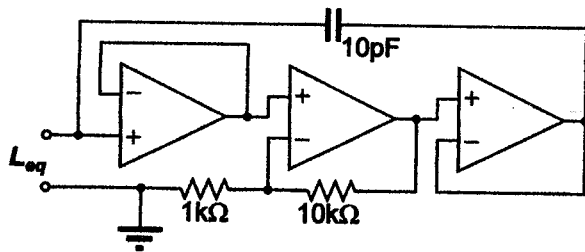
3. (15%) The following circuit is a basic building block for implementing an LC oscillator. Please find the DC bias current I_{DC} and small-signal input resistance R_{in}. [$\mu_p C_{ox}=50\mu A/V^2$, $V_{tp} = -1$V, $V_{SG}=V_{SD}=2.5$V]
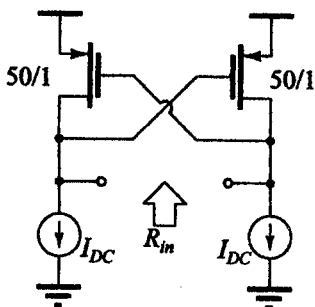
4. (15%) The following circuit is a hysteretic comparator. Please plot its voltage transfer characteristics curve (VTC or relationship between input and output) [Assume the OPA saturates at ±5V, R_1=2kΩ, and R_2=20kΩ. All transition points in the VTC must be clearly marked.]

試題隨卷繳回