

國立勤益技術學院九十二學年度研究所招生初試試題卷
 所別：資訊與電能科技研究所 組別：資訊科技組 身分別：一般生
 科目：電子學 准考證號碼： (考生自填)

考生注意事項：

- 一、請先核對考試科目與報考所組別是否相符。
- 二、本試題共六題，每題分數列於題後，共 100 分，請依順序作答。
- 三、答案須寫在答案卷上，本試題空白處或背面，僅做計算或草稿使用。
- 四、請在試題首頁准考證號碼之方格內，填上考生本人之准考證號碼。作答完畢後，請將「答案卷」及「試題」一併繳回。

- 一、An OPA-based circuit shown in Fig. 1, assuming diodes are ideal. Sketch the transfer characteristic with input voltage $-10V \leq v_i \leq 10V$. (12%)

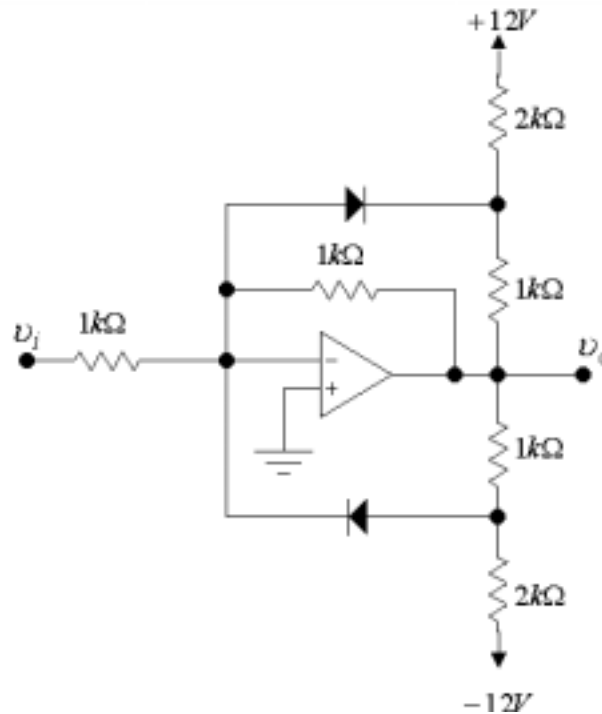


Fig. 1

- 二、For the circuit shown in Fig. 2.

- (a) Derive an expression for the transfer function $V_o(s)/V_i(s)$. (6%)
- (b) Find the dc gain and 3-dB frequency. (6%)
- (c) Design the circuit to obtain a dc gain 40 dB, a 3-dB frequency 1 kHz, and an input resistance of 1 kΩ. (6%)
- (d) With the components obtained in (c), at what frequency does the magnitude of transmission become unity? What is the phase angle at this frequency? (6%)

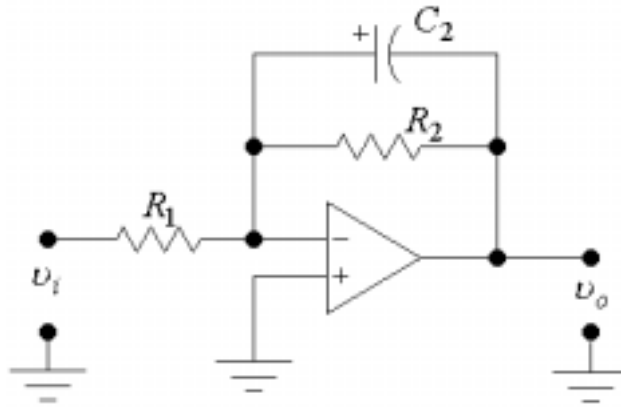


Fig. 2

三、 For a logic-circuit family employing a 3.3-V supply, and assuming all the characteristic parameters are ideal.

(a) Find the values of V_{th} , V_{IL} , V_{IH} , V_{OL} , V_{OH} , NM_L , NM_H . (14%)

(b) Sketch the voltage transfer characteristic (VTC). (6%)

四、 Sketch a CMOS realization for the function

$$Y = \overline{A + B(C + D)}. \quad (10\%)$$

五、 The transistor used has $\beta_0 = 100$, $r_\pi = 1k\Omega$, and $r_0 \rightarrow \infty$, shown as Fig. 3.

(a) Determine the value of f_L . (6%)

(b) Given $i(t) = 200\text{Hz}$ square, determine the percentage tilt in the output. (6%)

(c) What is the lowest-frequency square wave that exhibits no more than 2 percentage tilt? (7%)

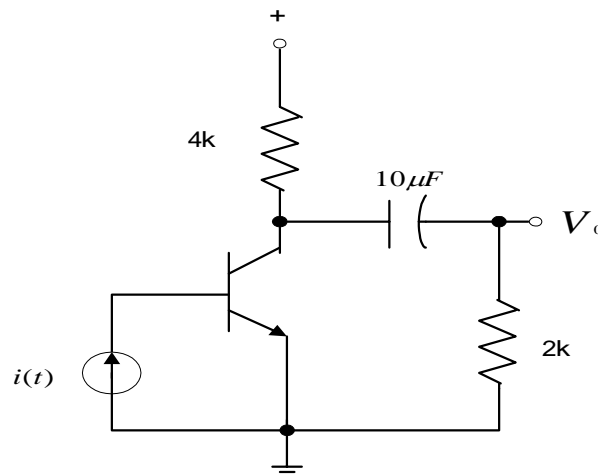


Fig.3

六、 Obtain the transfer function of the network shown as Fig 4. Verify that $V_o = (1/RC)\int V_s dt$ so that non-inverting integration is performed. (15%)

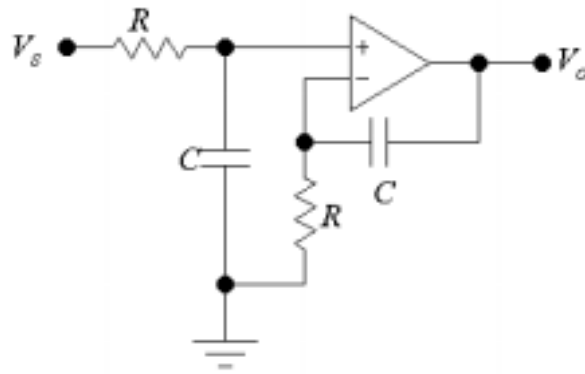


Fig.4