

明新科技大學 106 學年度研究所考試入學招生 試題卷

系所類別	科目	節次	准考證號碼 (考生請填入)	考試日期
電機工程系碩士班 (電機組)	電子學	第一節		106/4/23

※答案須寫在答案卷內，否則不予計分。

1. Assume that each of the diodes in Fig. 1, in the forward bias condition, D1 can be modeled as a constant voltage drop $V_{D1}=0.7V$, D2 can be modeled as a constant voltage drop $V_{D2}=0.8V$. Design R to make $I_D=0.5A$. (10%)
2. Considering circuit in Fig. 2, diodes D1, D2, D3, and resistor R are in series with supplying voltage 15V. Assume that three diodes have I-V characteristics as shown in Fig. 3. If $I_D=0.4A$, reference to Fig.3 to decide voltages V_{D1} , V_{D2} , V_{D3} , and V_R (20%)

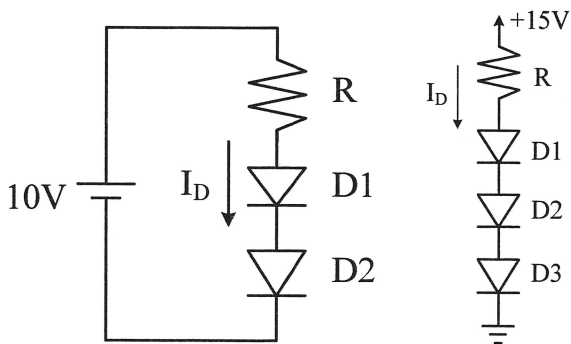


Fig. 1

Fig. 2

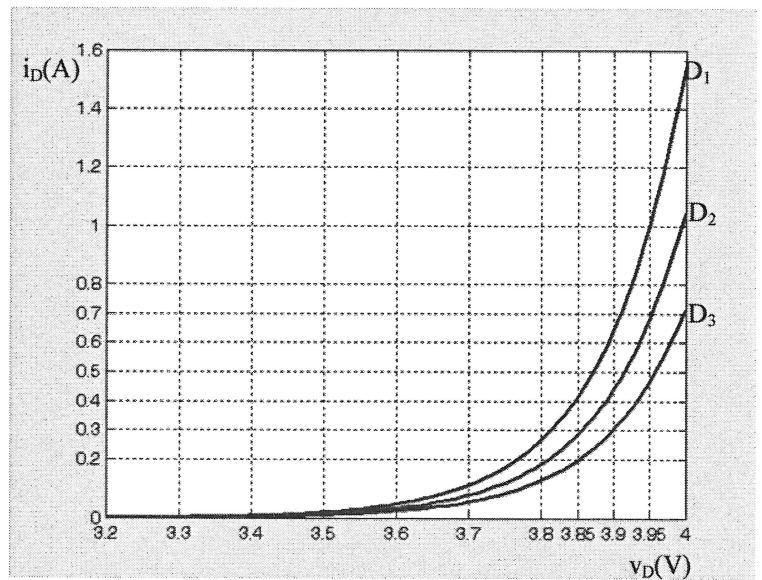


Fig. 3

3. In Fig. 4, assume that the OP-Amp is ideal. Derive the relationship between v_o and v_1 , v_2 , v_3 . (10%)
4. Fig. 5 is an inverting integrating circuit with its OP-Amp is ideal. Derive its voltage gain transfer function of $A_V(S)=V_O(S)/V_i(S)$. (10%)

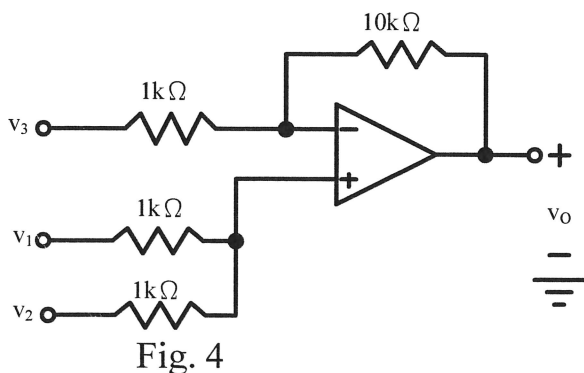


Fig. 4

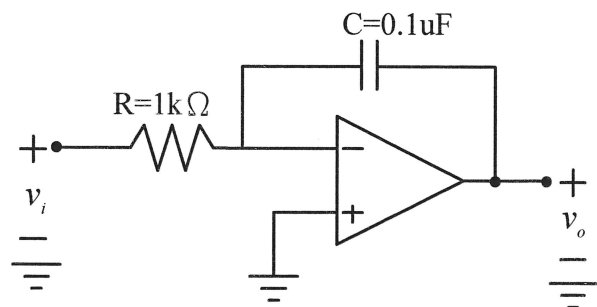


Fig. 5

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5. In Fig. 6, the NMOSFET has $V_t=1V$ and $(\mu_n C_{ox})(W/L)=1mA/V^2$. Find V_{GS} , V_D and I_D . (15%)

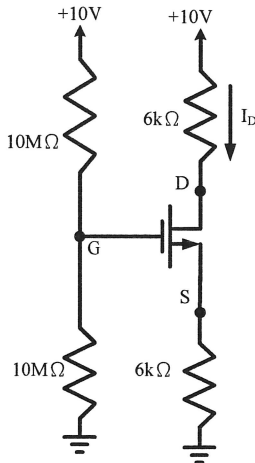


Fig. 6

6. Assume that the NPN transistor in Fig. 7 has $\beta=90$ and $V_{BE}=0.7V$, calculate I_B , I_C , I_E , V_C and V_E . (15%)

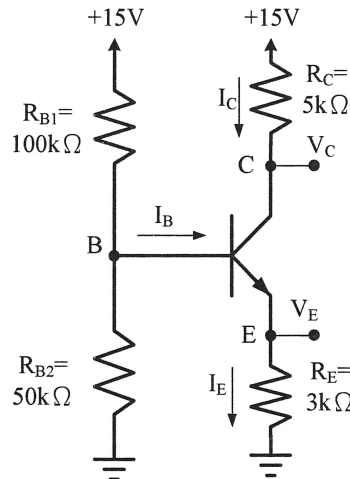


Fig. 7

7. Fig. 8 is a single stage N-MOSFET amplifier circuit. The N-MOSFET parameters are $V_t=1.0V$, $(\mu_n C_{ox})(W/L)=2mA/V^2$, $V_A=100V$.

- (a) Determine its DC operating points of V_{GS} , I_D , V_D , and small signal parameters of g_m and r_o . (10%)
- (b) Determine the small signal voltage gain of $A_v=(v_o/v_{sig})$. (10%)

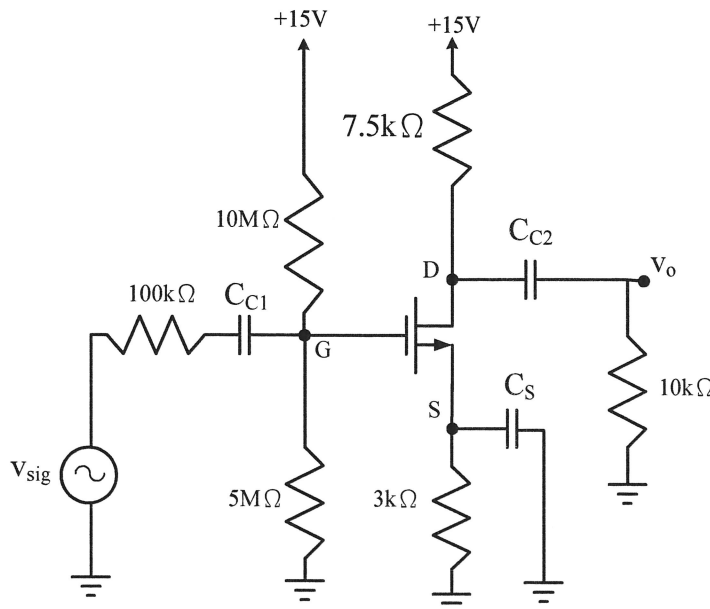


Fig.8