

所別	科目	准考證號碼 (請考生填入)	考試日期	節次	第 1 頁/ 共 3 頁
電機工程研究所	電子電路		94年5月1日	第二節	

一、 For the circuit in Fig.1, derive an expression for the DC gain and the 3-dB frequency. (10%)

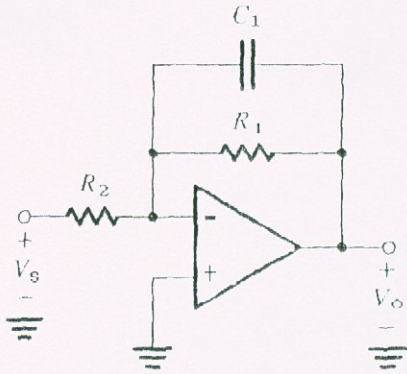


Fig. 1

二、 For the circuit in Fig. 2, determine the voltage at all nodes. Assume $V_{BE} \cong 0.7V$, $V_{CEsat} \cong 0.2V$ and $\beta = 100$. (10%)

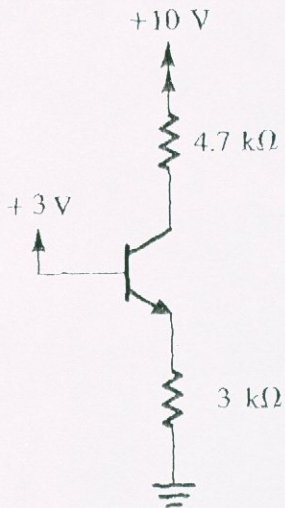


Fig. 2

三、 A Particular depletion-mode NMOS device for which $V_t = -2 V$ and $k'_n(W/L) = 200\mu A/V^2$. When operated at $V_{GS} = 0 V$, what is the drain current that flows for $V_{DS} = 5 V$. Assume $\lambda = 0$. (10%)

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四、 Determine the diode current I_D in the circuit shown in Fig. 4(a) and Fig. 4(b), assume $V_D = 0.7V$ for each diode. (10%)

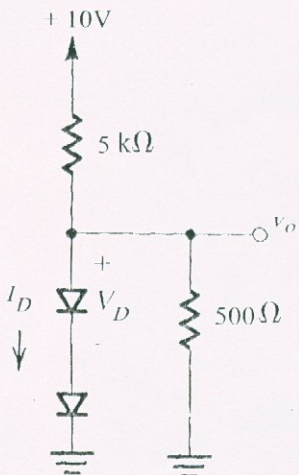


Fig. 4(a)

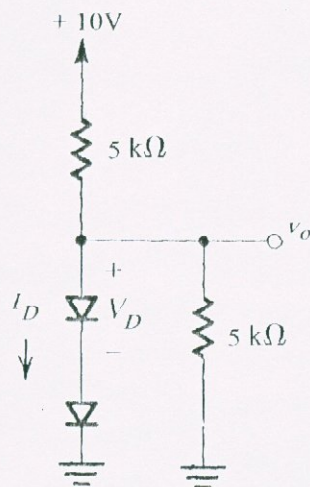


Fig. 4(b)

五、 In the circuit shown in Fig.5, each utilizing an ideal diode, sketch the output for the input shown. (10%)

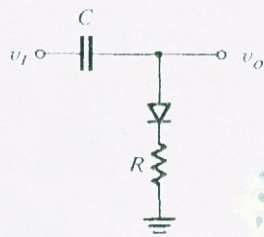
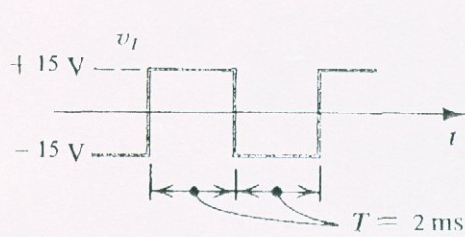


Fig. 5

六、 For the circuit in Fig.6, calculate (a) v_o and i_o , (6%) (b) the power dissipated in the 15Ω resistor. (4%)

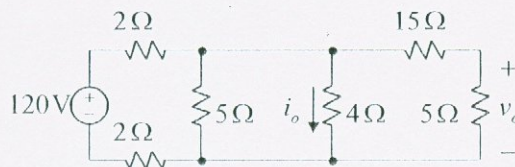


Fig. 6

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七、 Find the Thevenin equivalent circuit with respect to the terminals a, b for the circuit shown in Fig. 7. (10%)

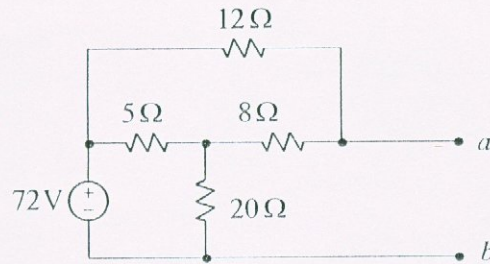


Fig. 7

八、 (a) Find the value of the variable resistor R_o in the circuit of Fig. 8 that will result in maximum power dissipation in the 6Ω resistor. (5%)
 (b) What is the maximum power that can be delivered to the 6Ω resistor. (5%)

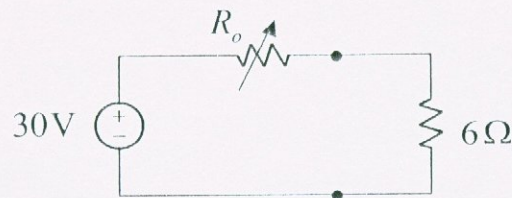


Fig. 8

九、 (a) A voltage phasor is given by $V = 110\angle -45^\circ$, what is the corresponding function $v(t)$ in the time domain. (5%)
 (b) For $v_1 = 10\cos(20t + 10^\circ)$, $v_2 = 30\sin(20t - 50^\circ)$, Which one is phase-lead to the other one? How many degree of the phase lead? (5%)

十、 Please transform the following functions into phasor forms. (10%)

(a) $v(t) = 5\cos(600t + 20^\circ)$, (b) $v(t) = -5\sin(600t - 110^\circ)$, (c) $v(t) = 3\cos 600t - 5\sin(600t + 110^\circ)$