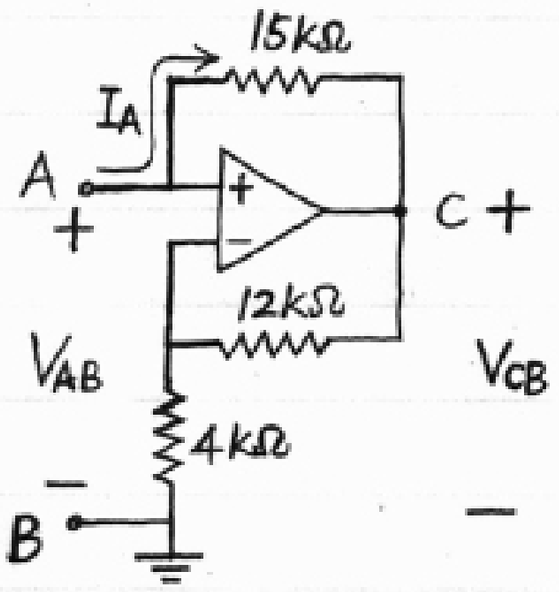
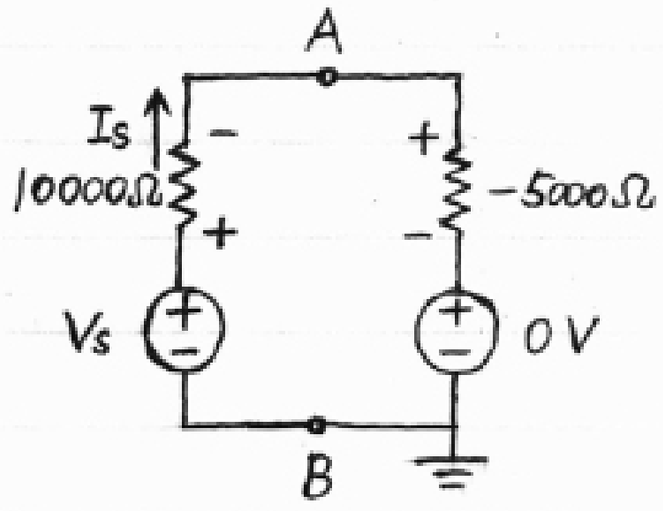
6-31





(a) $V_{CB} = \left(1 + \frac{12k}{4k}\right) V_{AB} = 4\,V_{AB}$ (non-inverting op amp circuit)

$V_{AB} = (15k)\,I_A + V_{CB}$ (KVL) $\Rightarrow$ $-3\,V_{AB} = (15k)\,I_A$

$\therefore$ $V_{AB} = (-5000)\,I_A$

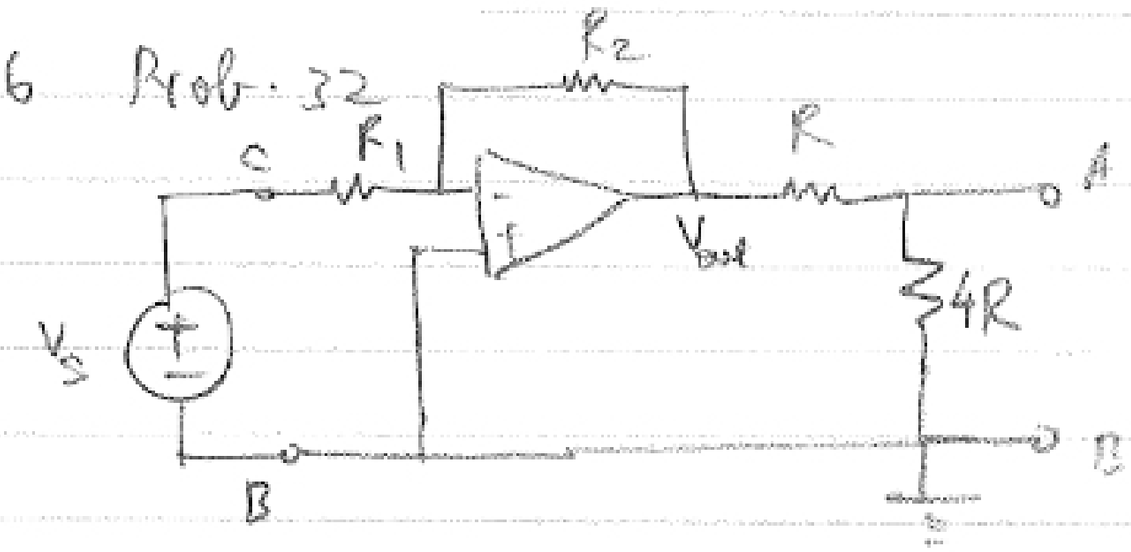
Match coefficients with (6.5):

$R_{th} = -5000\ \Omega$, $V_{oc} = 0\ V$.

(b) KVL: $V_S = (10000)\,I_S + (-5000)\,I_S + 0 = (5000)\,I_S$

$\therefore$ $I_S = \frac{V_S}{5000}$

Ch-6 Prob. 32



(a) Thevenin / Norton equivalent looking into AB

(i) Find V_{oc}

OP-Amp is in -ve feedback & is inverting

$$\Rightarrow V_{out} = -\frac{R_2}{R_1} V_s$$

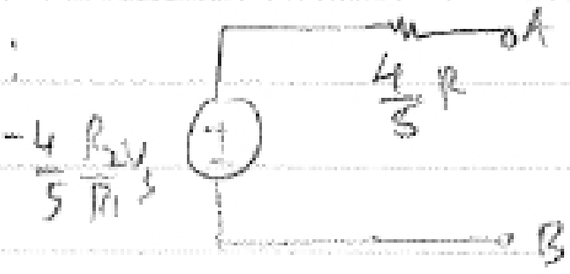
$$\Rightarrow V_{oc} = \frac{4}{5}\left(-\frac{R_2}{R_1}\right) V_s$$

(ii) Find I_{sc} (short AB)

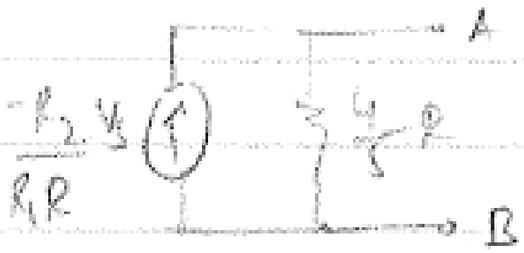
$$I_{sc} = \frac{V_{out}}{R} = -\frac{R_2}{R_1 R} V_s$$

$$R_{th} = \frac{V_{oc}}{I_{sc}} = \frac{4}{5}\left(-\frac{R_2}{R_1}\right) \cdot V_s \times \left(\frac{-R_1 R}{R_2 V_s}\right) = \frac{4}{5} R$$

Thevenin equivalent :



Norton Equivalent



(b) Looking in through CB

$V_{oc} - I_{sc} = 0$ ∴ there are no independent sources in the circuit under consideration

TO find R_{th}, add a test source V_t between CxB

test current $I_t = \frac{V_t - V_-}{R_1} = \frac{V_t - 0}{R_1}$

$\frac{V_t}{I_t} = R_{th} = R_1$

Thevenin / Norton equivalent: