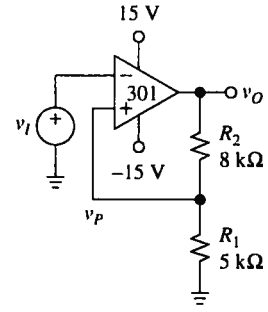
ECEN 457 (ESS) **Due: November 17, 2015**
FALL "15

HOMEWORK # 6

Undergraduate students pick only two problems.

Problem 1. Problem 9.12 (fourth-edition)

9.12 (*a*) Assuming the op amp of Fig. 9.20*a* saturates at ±13 V, sketch and label the VTC if a resistance $R_3 = 33$ kΩ is connected between the nodes labeled v_P and −15 V. (*b*) Suitably modify the circuit of Fig. 9.21*a* so that it gives $V_{TL} = 1$ V and $V_{TH} = 2$ V.

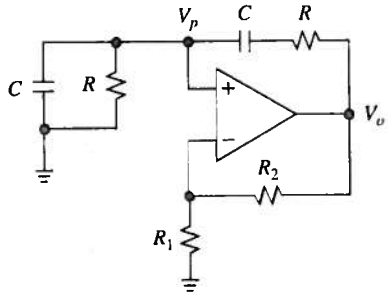


(*a*)

FIGURE 9.20

Problem 2. Problem 10.1 (fourth-edition)

10.1 Show that for arbitrary component values in its positive-feedback network, the Wien-bridge circuit of Fig. 10.2*a* gives $B(jf_0) = 1/(1 + R_s/R_p + C_p/C_s)$ and $f_0 = 1/(2\pi\sqrt{R_s R_p C_s C_p})$, where R_p and C_p are the parallel and R_s and C_s the series elements. Hence, verify that neutral stability requires $R_2/R_1 = R_s/R_p + C_p/C_s$.

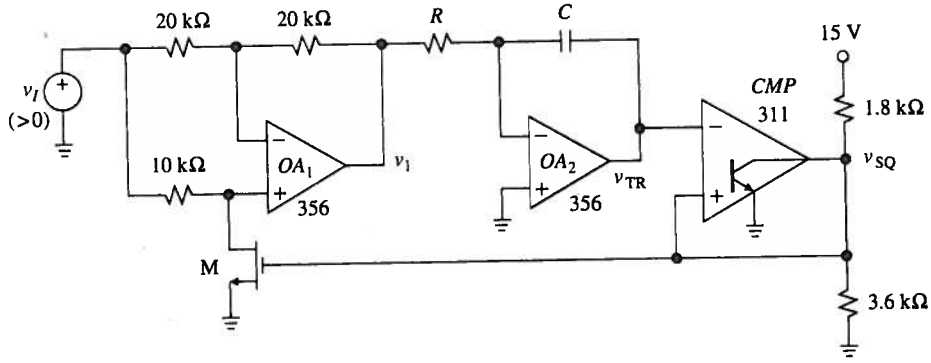


(*a*)

FIGURE 10.2

Problem 3. Problem 10.31 (fourth-edition)

10.31 Shown in Fig. P10.31 is another popular VCO. Sketch and label its waveforms, and find an expression for f_0 in terms of v_I.



Problem 4. Problem 11.17 (fourth-edition)

11.17 Using a 741 op amp, an LM385 2.5-V reference diode, and *pnp* BJTs, design an overload-protected negative regulator with $V_O = -12$ V and $I_{O(\max)} = 100$ mA.