1. The full-wave rectifier circuit shown in Fig.1 has an input signal whose frequency is 60 Hz. The RMS value of $v_S$=8.5 V. Assume each diode cut-in voltage is $V_\gamma$=0.7 V. (a) What is the maximum value of $V_O$? (b) If R=10 Ω, determine the value of C such that the ripple voltage is no larger than 0.25 V. (c) What must be the PIV rating of each diode?

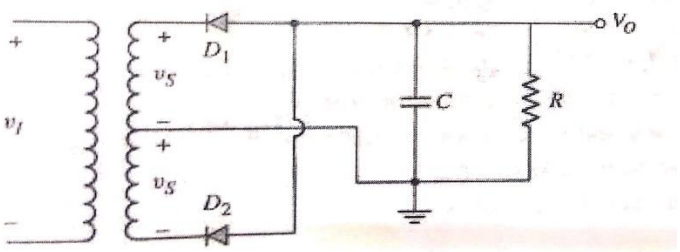


Fig.1

2. The circuit in Fig.2 is a complementary output rectifier. If $v_S$= 26 sin $[2\pi(60)t]$ V, sketch the output waveform $v_o^+$ and $v_o^-$ versus time, assuming $V_\gamma$= 0.6 V for each diode.

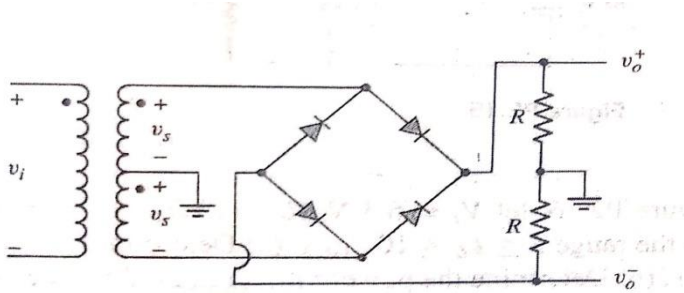


Fig.2

3. (a) Sketch $v_o$ versus time for the circuit in Fig.3. The input is a sine wave given by $v_i$ = 10 sin $\omega t$ V. Assume $V_\gamma$ = 0. (b) Determine the RMS value of the output voltage.

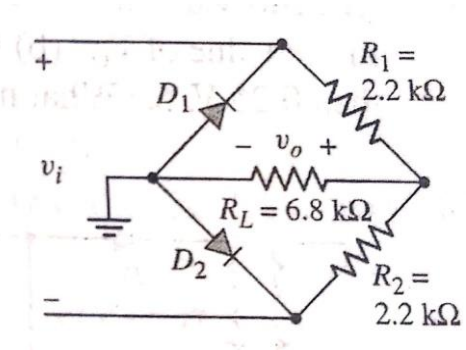


Fig.3

4. A voltage regulator is to have a nominal output voltage of 10 V. The specified Zener diode has a rating of 1W, has a 10 V drop at $I_Z$ = 25 mA, and has a Zener resistance of $r_z$= 5Ω. The input power supply has a nominal value of $V_{PS}$ = 20 V and can vary by ±25 percent. The output load current is to vary between $I_L$= 0 and 20 mA. (a) If the minimum Zener current is to be $I_Z$ = 5 mA, determine the required $R_i$. (b) Determine the maximum variation in output voltage. (c) Determine the percent regulation.

5. Consider the circuit in Fig.5. Let $V_\gamma$ = 0. The secondary voltage is given by $v_s$=$V_s \sin \omega t$, where $V_s$=24 V. The Zener diode has parameters $V_Z$= 16 V at $I_Z$ =40 mA and $r_Z$ = 2Ω. Determine $R_i$ such that the load current can vary over the range $40 \leq I_L \leq 400$ mA with $I_{Z(min)}$= 40 mA and find C such that the ripple voltage is no larger than 1 V.

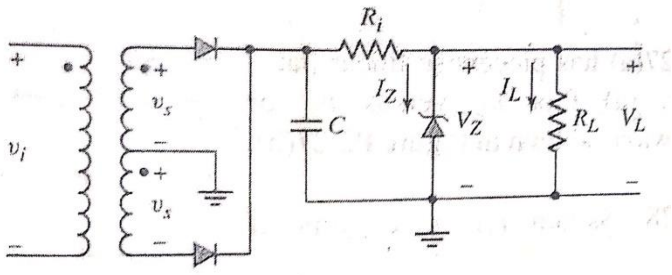


Fig.5

6. The diode in the circuit of Fig.6a has piecewise linear parameter $V_\gamma$= 0.7 V and $r_f$ = 10 Ω. (a) Plot $v_O$ versus $v_I$ for $-30 \leq v_I \leq 30\ V$. (b) If the triangular wave, shown in Fig.6b, is applied, plot the output versus time.

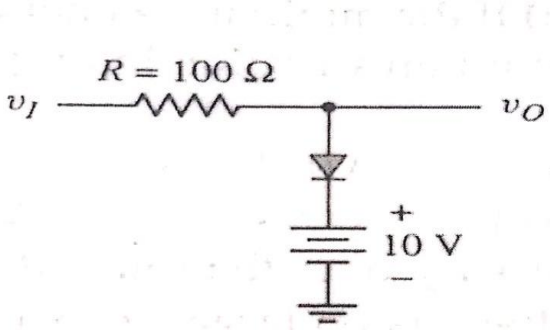


Fig.6a

7. The diodes in the circuit in Fig.7 have the same piecewise linear parameters as described in problem 2.37. Determine the output voltage $V_O$ and the currents $I_{D1}$, $I_{D2}$, $I_{D3}$ and $I$ for the following input conditions: (a) $V_1$= $V_2$=0;(b) $V_1 = V_2$= 5V; (c) $V_1$=5 V, $V_2$=0; and (d) $V_1$= 5 V, $V_2$=2 V.

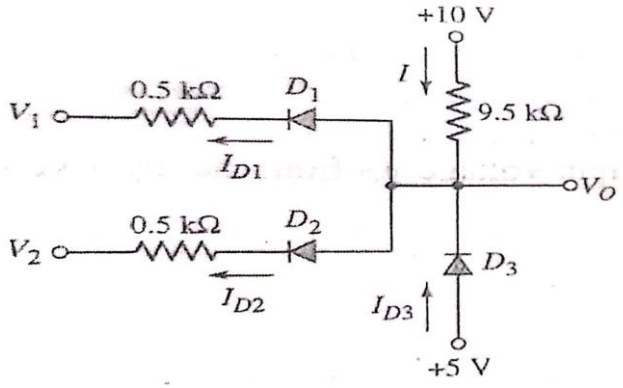


Fig.7

8. (a) For the circuit in Fig.8, each diode has $V_\gamma$= 0.6 V. Plot $v_O$versus $v_I$ over the range $0 \leq v_I \leq 10\ V$. (b) Compare the result of the part (a) with a computer simulation analysis.

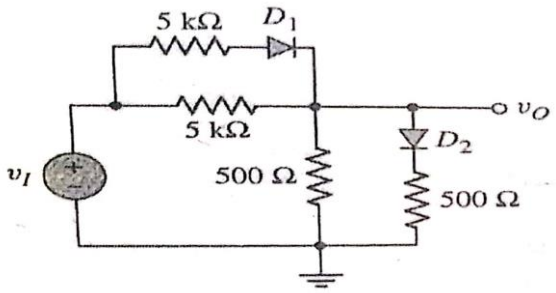


Fig.8

9. Assume $V_\gamma$= 0.7 V for each diode in the circuit in Fig.9. Plot $v_O$ versus $v_I$ for $-10 \leq v_I \leq +10\ V$.

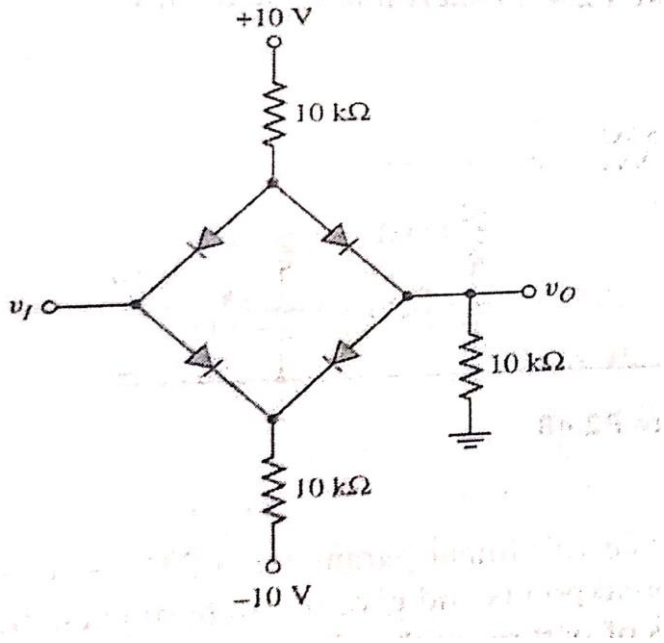


Fig.9