

$$\therefore V_a = 5V$$

$$\therefore V_a \left(\frac{1}{2} + 1 + \frac{1}{18} \right) - V_o \frac{1}{18} - V_b = 0$$

$$\Rightarrow V_a \frac{14}{9} - V_o \frac{1}{18} - V_b = 0$$

$$\Rightarrow 28V_a - 18V_b - V_o = 0$$

closed loop #14

$$\Rightarrow 18V_b + V_o = 140 \quad \textcircled{1}$$

$$\therefore V_b \left(1 + \frac{1}{3} + \frac{1}{4} \right) - V_o \frac{1}{4} - V_a = 0$$

$$\Rightarrow V_b \frac{19}{12} - V_o \frac{1}{4} = 5$$

$$\Rightarrow 19V_b - 3V_o = 60 \quad \textcircled{11}$$

$$\textcircled{1}, \textcircled{11} \Rightarrow$$

$$V_b = 6.57V$$

$$V_o = 21.6V$$

$$\frac{2-v}{2} + \frac{2-4}{3} = 0$$

$$\Rightarrow v = 0.66$$

closed loop #18

$$\frac{4-2}{3} + \frac{4-v}{2} = 0$$

$$\Rightarrow v = 5.33V$$

$$\therefore V_o = 5V$$

$$v_1 = \frac{5}{3} v$$

closed loop #16

$$\frac{\frac{5}{3} - 1}{20} + \frac{\frac{5}{3} - v_2}{10} = 0$$

$$\Rightarrow \frac{1}{30} + \frac{1}{6} - \frac{v_2}{10} = 0$$

$$\Rightarrow v_2 = 2v$$

$$\frac{2}{40} + \frac{v_o}{100} = 0$$

$$\Rightarrow v_o = -5$$

closed loop #16

$$\frac{v_i}{100} + \frac{v_i - v}{40} = 0$$

$$\Rightarrow v_i - v = -\frac{v_i 40}{100}$$

$$\Rightarrow v = \frac{7}{5} v_i$$

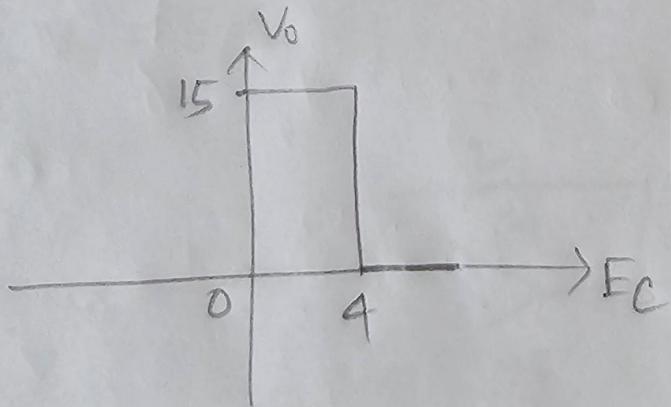
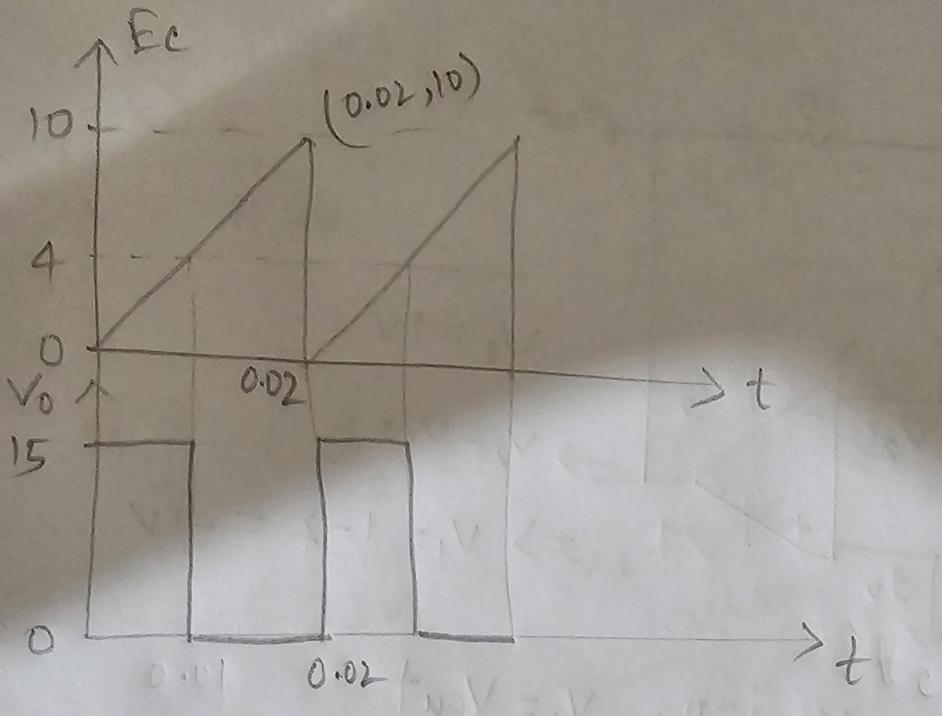
closed loop #15

$$\frac{\frac{7}{5} v_i}{50} + \frac{\frac{7}{5} v_i}{100} + \frac{v_o}{80} = 0$$

$$\Rightarrow \frac{v_o}{80} = -\frac{21 v_i}{500}$$

$$\Rightarrow \frac{v_o}{v_i} = -3.36$$

open loop #6



open loop #6

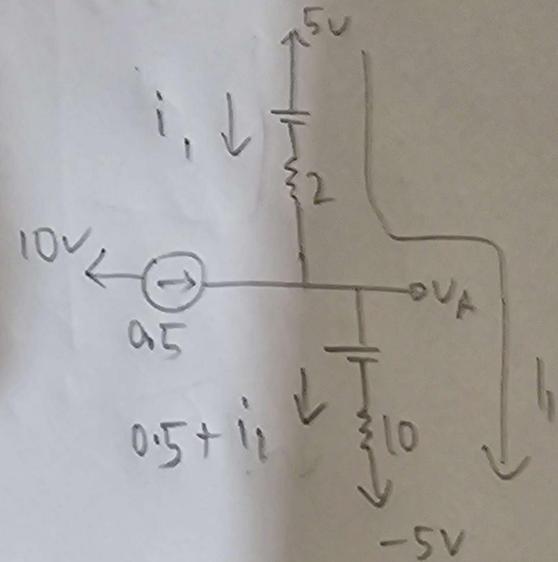
$$V = \frac{10}{0.02} \ln t$$

$$\Rightarrow 4 = \frac{10}{0.02} \ln t \Rightarrow t = e^{0.008}$$

high time = 40%

assume both diode are on

diode #16



$$\cancel{11} \quad -8 + 0.7 + 2i_1 + 0.7 + 10i_1 + 10 \times 0.5 - 5 = 0$$

$$\Rightarrow i_1 = 0.3$$

$$\therefore V_A = 0.7 + 10(0.3 + 0.5) - 5$$

$$= 3.7V$$

summer 24

assumption,

D_1 on

D_2 on

i_1

$$-10 + 4i_1 + 2i_2 - 0.5 + 4.5 = 0$$

$$\Rightarrow 4i_1 + 2i_2 = 6 \quad \textcircled{1}$$

i_2

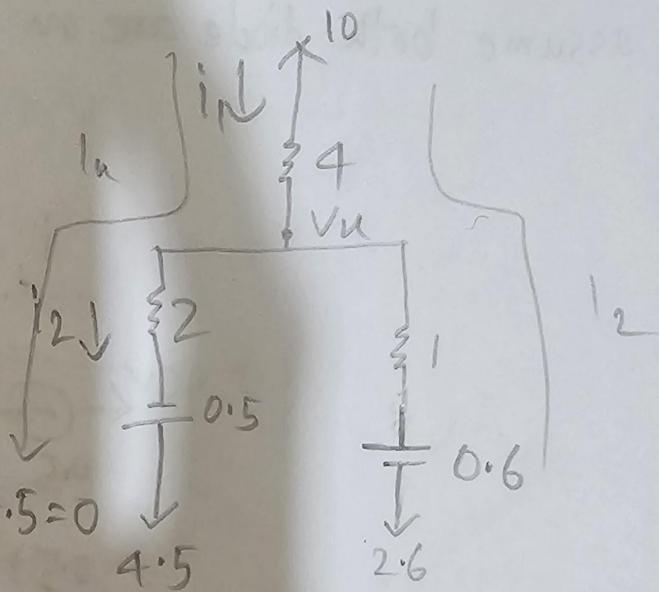
summer 24 mid

$$-10 + 4i_1 + i_1 - i_2 + 0.6 + 2.6 = 0$$

$$\Rightarrow 5i_1 - i_2 = 6.8 \quad \textcircled{11}$$

$$\textcircled{1}, \textcircled{11} \Rightarrow i_1 = 1.4, i_2 = 0.2$$

$$\therefore I_{D_1} = 0.2, I_{D_2} = 1.2$$



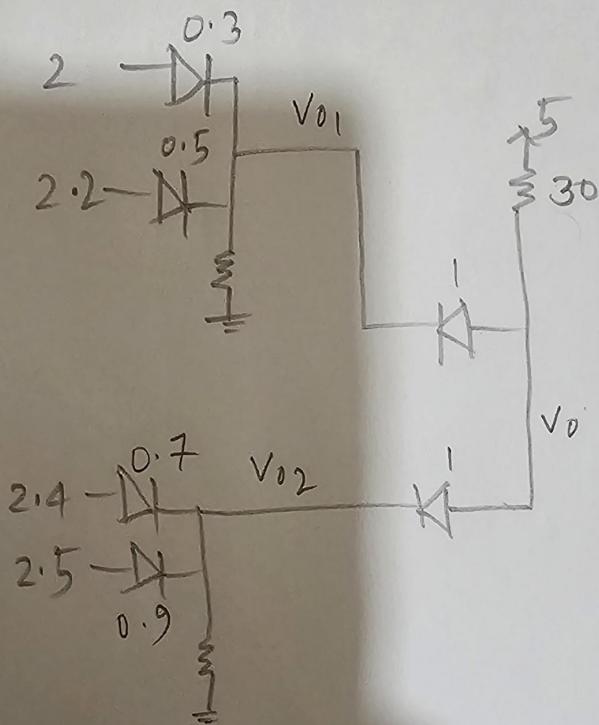
$$v_u \left(\frac{1}{4} + 1 + \frac{1}{2} \right) - \frac{10}{4} - \frac{9}{2} - \frac{3 \cdot 2}{1} = 0$$

$$\Rightarrow v_u = 4.4$$

summer24mid

diode logic #11

diode logic #11



$$V_{01} = 2 - 0.3 = 2.2 - 0.5 = 1.7V$$

$$V_{02} = 2.4 - 0.7 = 1.7V$$

} maximum voltage
for OR gate

D4 off