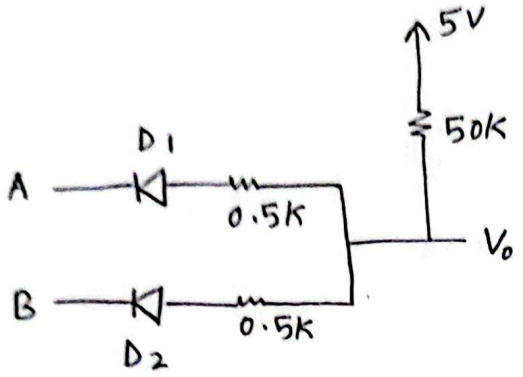
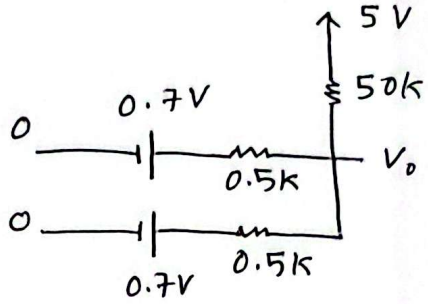
Azmani Sultana

Id 22201949

CSE350

Sec : 13





case 1 : (0,0)

$$I_1 + I_2 = I_3$$

$$\Rightarrow \frac{V_o - 0 - 0.7}{0.5} + \frac{V_o - 0 - 0.7}{0.5} = \frac{5 - V_o}{50}$$

$$\Rightarrow 2V_o - 1.4 = \frac{0.5(5 - V_o)}{50}$$

$$\Rightarrow 100V_o - 70 = 2.5 - 0.5V_o$$

$$\Rightarrow -72.5 = -100.5V_o$$

$$\Rightarrow V_o = 0.72\,V$$

$$I_1 = \frac{V_o - 0 - 0.7}{0.5} = \frac{0.72 - 0.7}{0.5} = 0.04\,mA$$

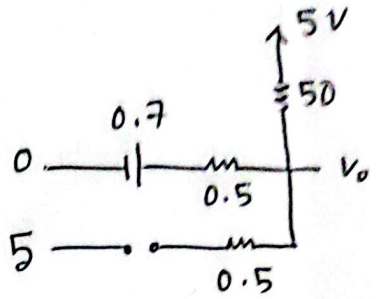
$$I_2 = \frac{V_o - 0 - 0.7}{0.5} = \frac{0.72 - 0.7}{0.5} = 0.04\,mA$$

$$I_3 = \frac{5 - V_o}{50} = 0.0856\,mA$$

$$P_{dis} = I_1^2(0.5) + I_2^2(0.5) + I_3^2(50) + 0.7I_1 + 0.7I_2$$

$$= 0.123968\,mW$$

case 2 : (0,1)



$I_1 = I_3$

$\Rightarrow \frac{V_o - 0 - 0.7}{0.5} = \frac{5 - V_o}{50}$

$\Rightarrow 50V_o - 35 = 2.5 - 0.5V_o$

$\Rightarrow 50.5V_o = 37.5$

$\therefore V_o = 0.71257\ V$

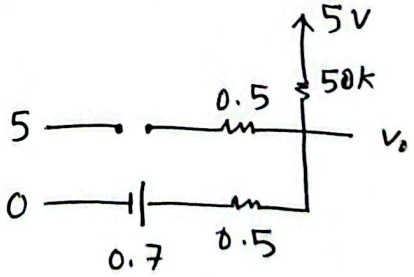
$I_1 = \frac{V_o - 0 - 0.7}{0.5} = 0.08\ mA$

$I_3 = \frac{5 - V_o}{50} = 0.08528\ mA$

$P_{dis} = I_1^2(0.5) + I_3^2(50) + 0.7I_1$

$= 0.422152\ mW$

case 3 : (1,0)

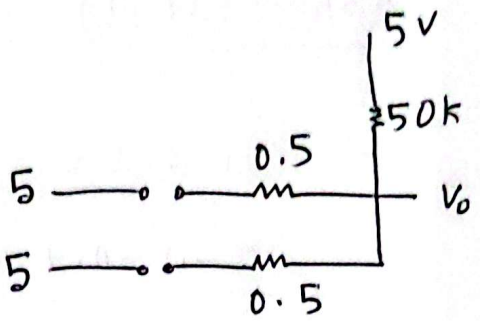


$V_o = 0.74\ V$

$P_{dis} = 0.422152\ mW$

(as same as case 2)

case4 : (1,1)



$$0 = \frac{5 - V_o}{50}$$

$$\Rightarrow V_o = 5\ V$$

$$I_3 = \frac{5 - V_o}{50} = 0$$

$$P_{dis} = 0\ mW$$

A(V)	B(V)	Output voltage, V_o (V)	Dissipated power (mW)
0	0	0.72	0.423968
0	5	0.74	0.422152
5	0	0.74	0.422152
5	5	5	0