DELD Practice Sheet :- 2 Zala Divy Baldevbhai
A045
V20CS045

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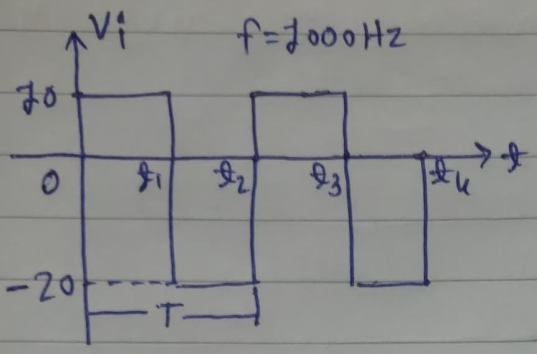
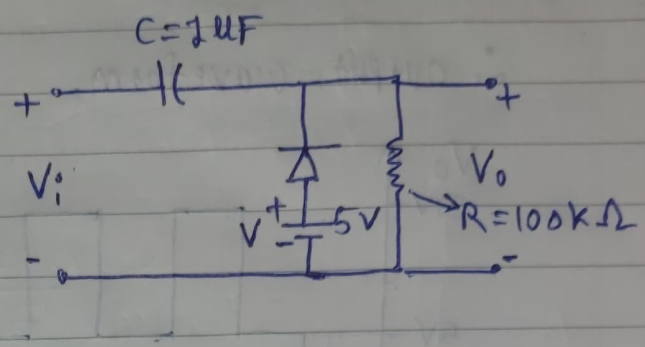
(7)





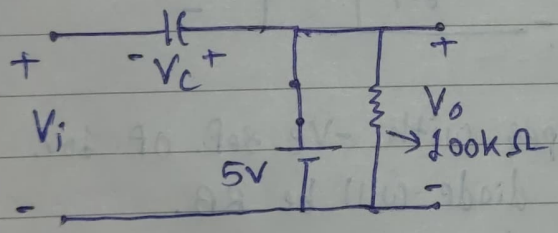
→ $T = 1/f = 1/1000 = 1\,msec$

$\therefore t_1 = t_2 = 1/2\,msec = 0.5\,ms$

→ (i) $0 < t < t_1 \Rightarrow I_0 = 0 \Rightarrow \underline{V_0 = 0\,V}$ (diode will be in RB)

$V_i = 10\,V$

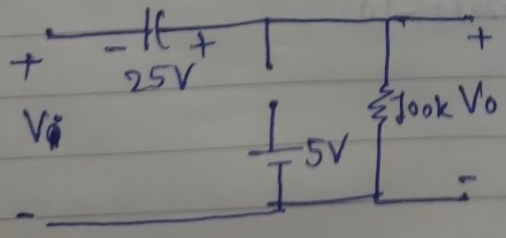
→ (ii) $t_1 < t < t_2$



→ diode will be in FB $\therefore V_0 = 5\,V$

$\therefore V_C = 5-(-20) = 25\,V$ (capacitor)

(iii) $t_2 < t < t_3$



→ Again diode will be in RB.

According KVL, $25 + V_C - V_0 = 0$

$\therefore V_0 = 25 + 10 = 35\,V$

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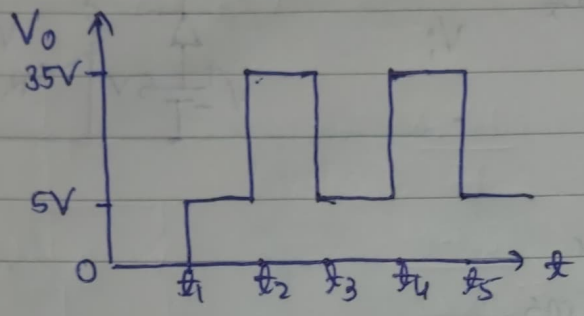
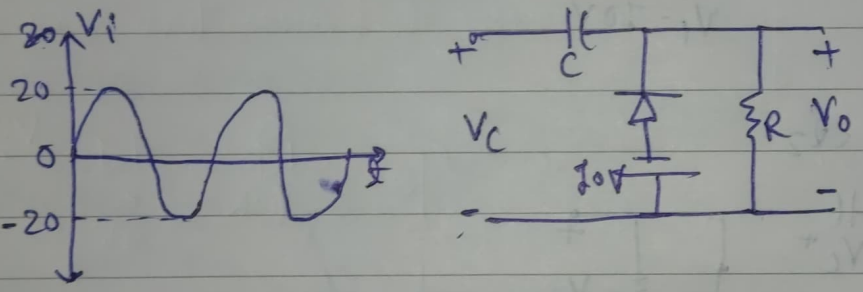
∴ output waveform,



(2) Determine output waveform



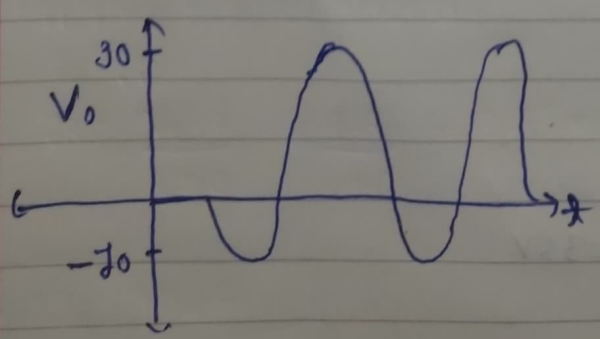
→ This circuit is +ve clamper with -ve ref. of 10V.

→ for 1st +ve half cycle, diode will be RB.
∴ $V_o = 0$ as $i = 0$ due to charging of capacitor.

→ for 1st -ve half cycle, diode will be FB.
$V_o = 10V$ and capacitor will be charged to 10V.

→ After 1 complete cycle capacitor will provide dc voltage of 10V
∴ $V_o = 10 + V_i$
∴ $V_{max} = 10 + 20 = 30$, $V_{min} = 10 + (-20) = -10$

→ output waveform,



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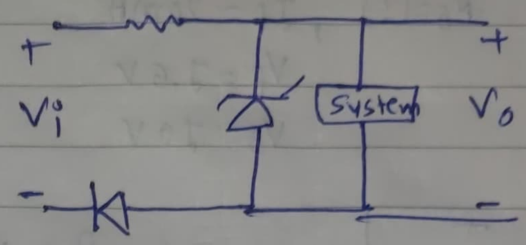
(3)

(i) for +ve half cycle,



1) $V_i < 20$

Zener diode → open circuited

$\therefore V_o = V_c$

2) $V_i > 20$

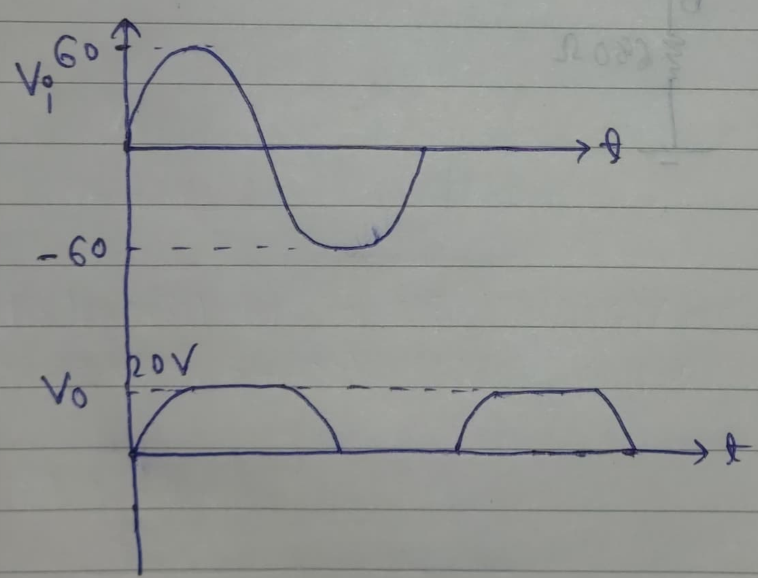
Zener diode will provide const. voltage of 20V.

$\therefore V_o = 20V$

(ii) for -ve half cycle,

→ Silicon diode will be open circuited and zener will be in FB.

$\therefore V_o = 0V$



(4) $\lambda = 5490 A^\circ$

$\therefore E = \frac{12400}{\lambda} eV$

$= \frac{12400}{5490} eV$

$\therefore E = 2.258 eV$

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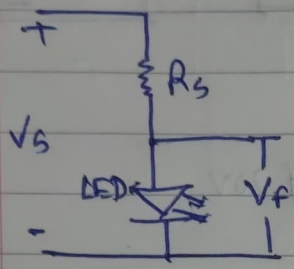
(5) $R_S = (?)$, $I_f = 20mA$

$V_f = 1.6V$

$V_S = 10V$

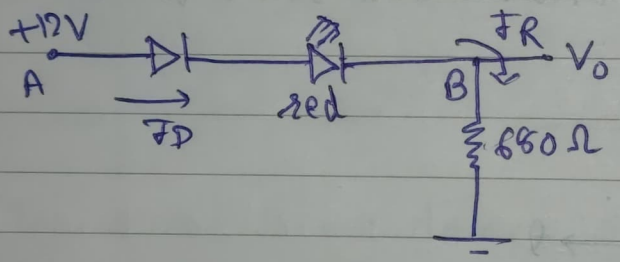


$$R_S = \frac{V_S - V_f}{I_f}$$

$$= \frac{10 - 1.6}{20 \times 10^{-3}}$$

$$R_S = 420\Omega$$

(6) $V_o = (?)$ and series diode current I_S,



→ Applying KVL,

$V_A - V_B = 1.8 + 0.7$

$\therefore V_B = V_A - 2.5$

$= 12 - 2.5$

$V_B = 9.5V$

→ $V_B = V_o = 9.5$

→ Applying KCL at node B,

$I_o = I_R$

$I_R = \frac{V_o - 0}{680} = \frac{9.5}{680} = 13.97mA \approx 14mA$

$\therefore I_o = 14mA$

—x—x—