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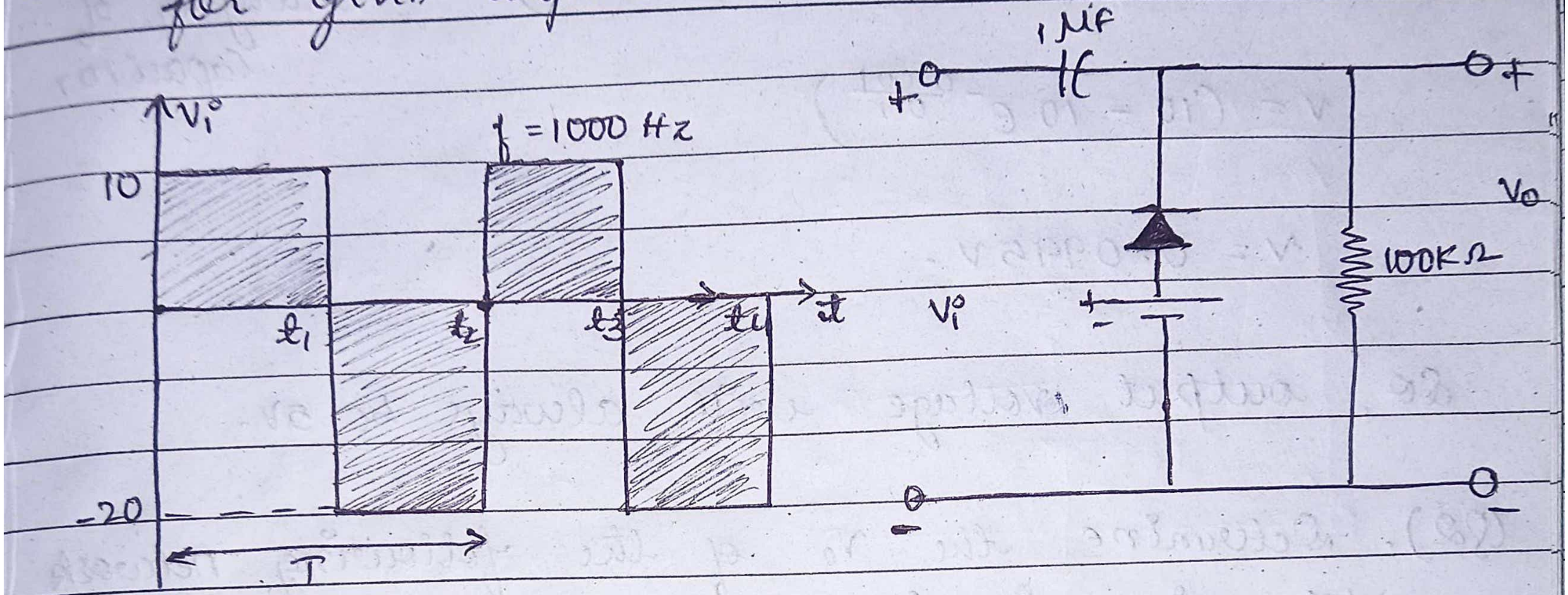
DELD PROBLEM SHEET 2.

Q: Determine the V_0 of the following network for given input.



When input rises from 0 to 10, means step input but output won't be like step, the capacitor charges so output will be 5V until the Vout will be more than 5V, we can calculate.

$$\tau = RC$$
$$= 100 \times 10^3 \times 10^{-6} = 0.1\,s$$

In 0.1 s it reaches 63% of input voltage means 6.35..

Then. frequency = 1000 Hz

$$T = \frac{1}{1000} = 0.0001\ sec.$$

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→ Vout is 0.001 sec. It will change its priority.

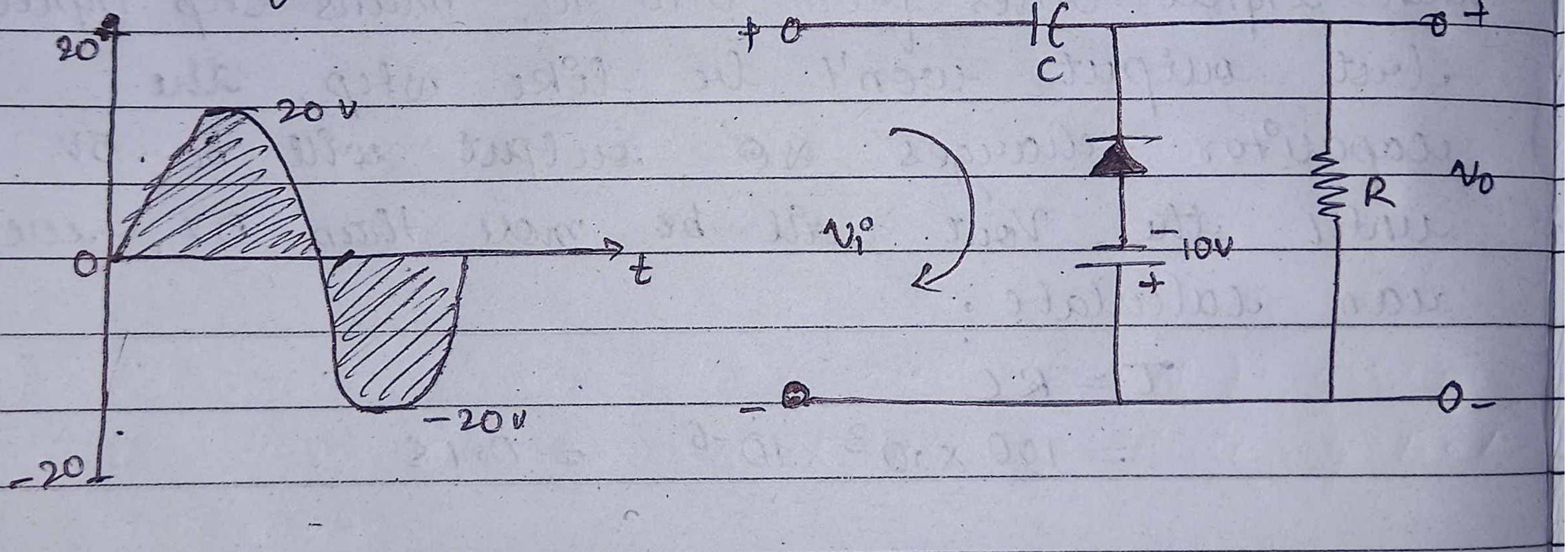
Vout at 0.001 = $(V_0 - V_0 e^{-t/RC})$ charging of capacitor

$V = (10 - 10\, e^{-\frac{0.001}{0.1}})$

$V = 0.0995 V$.

So, output voltage will always be 5V.

(Q2). Determine the v_0 of the following network for given input.



$V_{R)max} = V_{i)max} + 10 = 20V + 10\ V$ when capacitor is uncharged.
$= 30V$.

So, $V_{o)max} = 30$

Also, $V_0 = V_i + 10$

So, $V_{o)max} = +30V$

$V_{o)min} = -10V$

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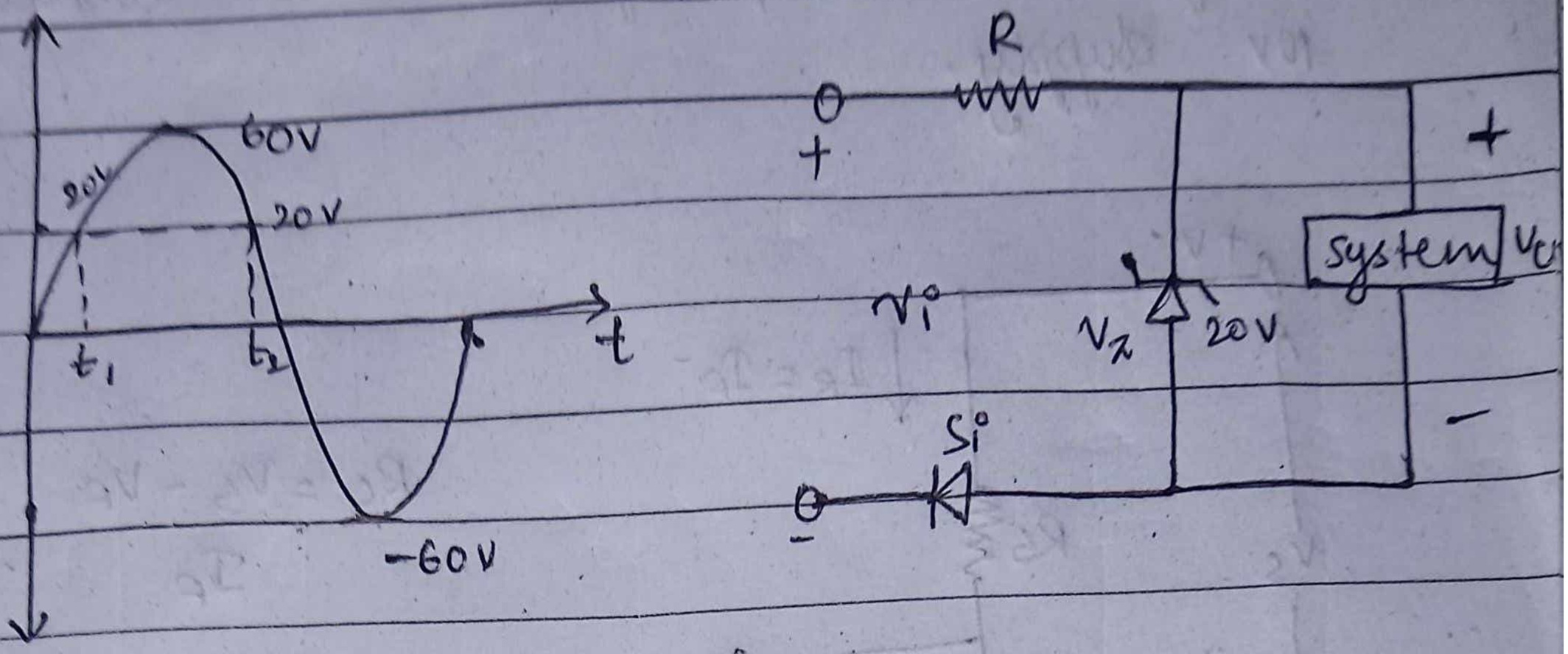
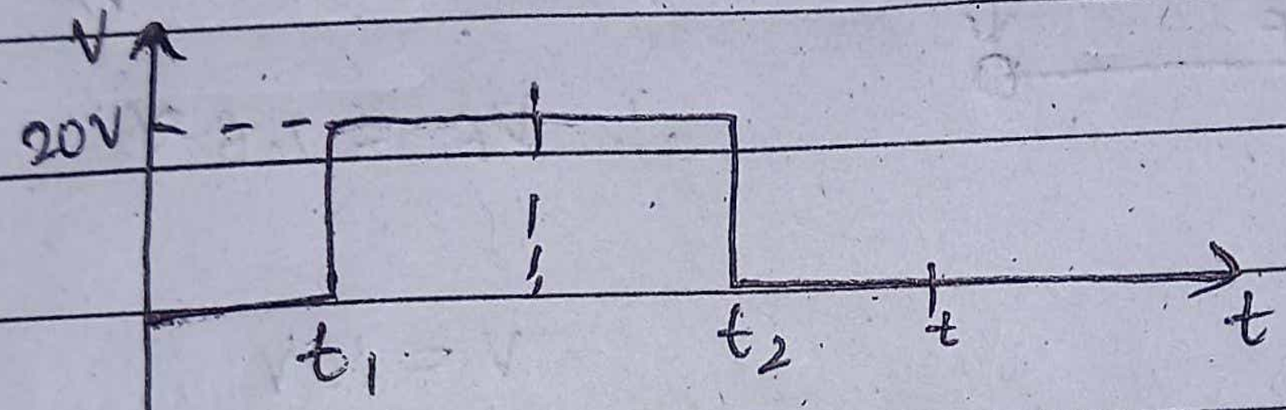
(Q3) Draw the output voltage waveform for the circuit.





(Q4) A green colour LED Emits light with the wavelength of 5490 A°. Find the energy gap of the material used to fabricat, the LED.

$$E = \frac{hc}{\lambda} J = \frac{18400}{5490} eV = 2.26 eV$$

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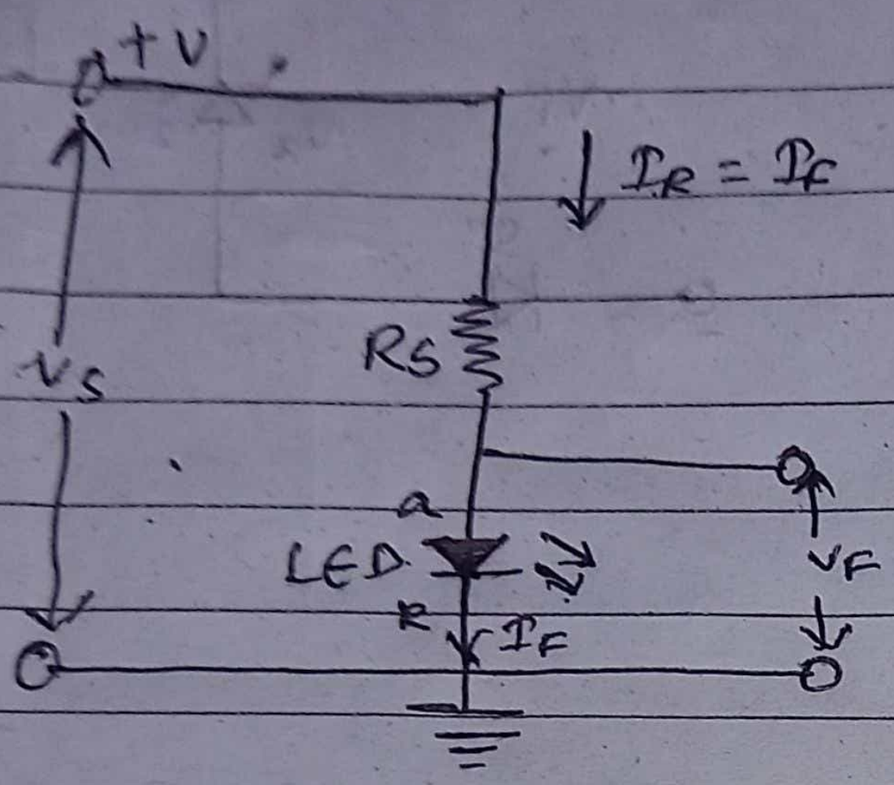
Q5) Find the required series resistor to limit the current through LED to 20mA with a forward drop of 1.6V when connected to 10V supply.



$$R_S = \frac{V_S - V_F}{I_F}$$

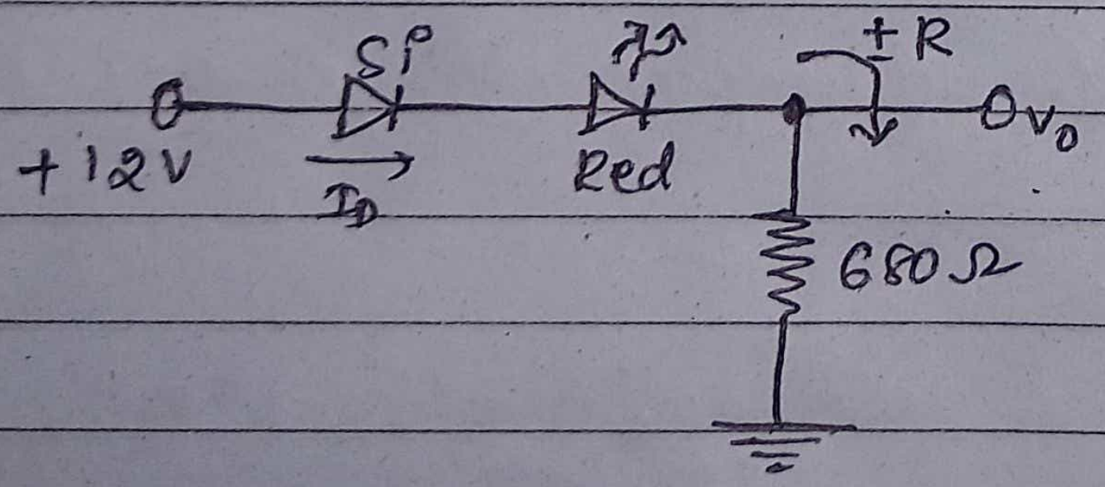
$I_F = 20 \times 10^{-3} A$

$\therefore V_F = 1.6 V$

$V = 10V$

$$\therefore R_S = \frac{V_S - V_F}{I_f} = \frac{10 - 1.6}{20 \times 10^{-3}} = 420\Omega$$

Q6) Determine the V_o & I_D (Series current). Assume the forward drop across LED & Si diode & 1.8V and 0.7V.



$$R = \frac{V_S - V_F}{I} = \frac{12 - 2.5}{I}$$

$\Rightarrow 680 = \frac{9.5}{I} \Rightarrow I = 0.0139A$

$V_o = IR \Rightarrow = 0.0139 \times 680$

$= 9.5V$