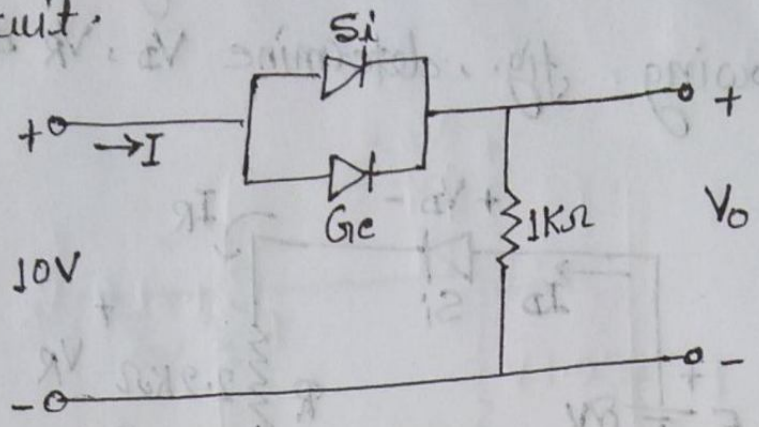
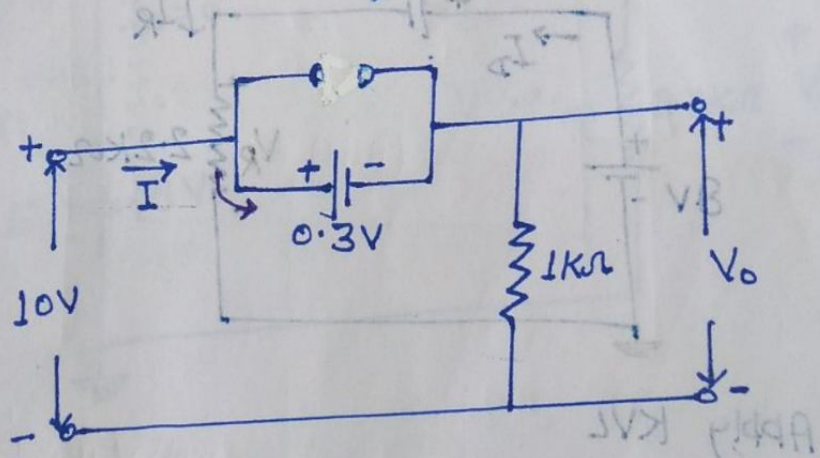
Q1. Determine V_o and I for the following circuit.



Soln The cut-in voltage of Ge diode is 0.3V while that for Si diode is 0.7V. Hence Ge diode will start conducting first and it acts as a battery of 0.3V.

Then the above ckt. reduces -



Applying KVL,

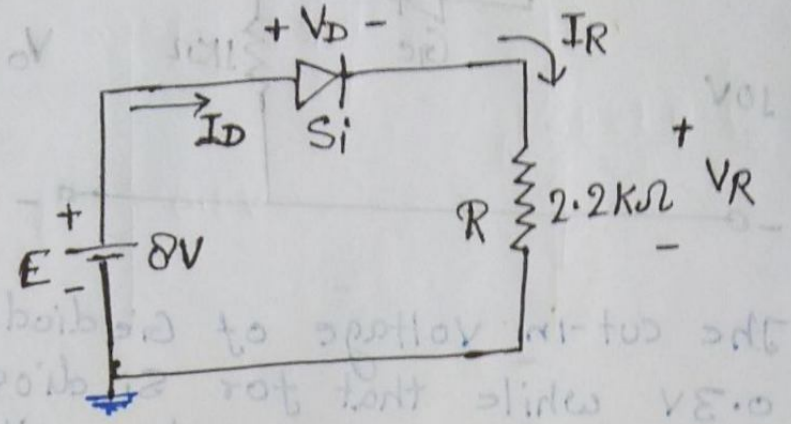
$$10 - 0.3 - I \times 1 \times 10^3 = 0$$

$$\Rightarrow I = \frac{9.7}{10^3} = \underline{9.7\ mA} \quad \text{Ans.}$$

$$\therefore V_o = 9.7\ mA \times 1\ K\Omega$$

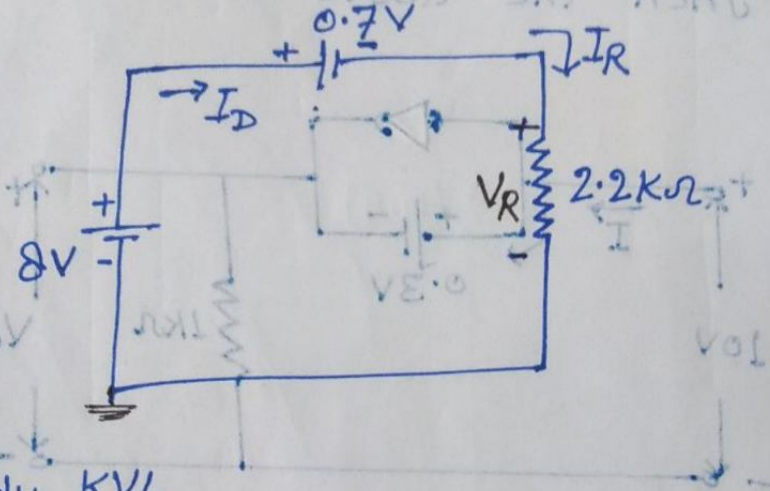
$$= \underline{9.7\ V} \quad \text{Ans.}$$

Q. For the series diode configuration of following fig., determine V_D, V_R and I_D



Soln- Here, diode is in the 'ON' state.

$\therefore V_D = \underline{0.7V}$ Ans.



Apply KVL

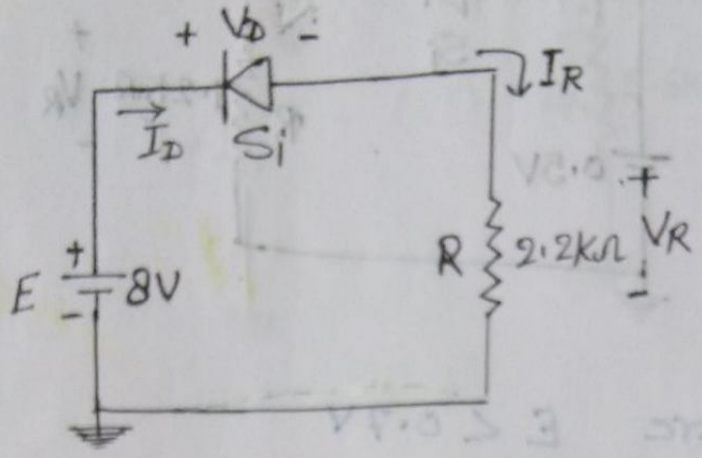
$$8 - 0.7 - V_R = 0$$

$$\Rightarrow V_R = \underline{7.3V} \text{ Ans.}$$

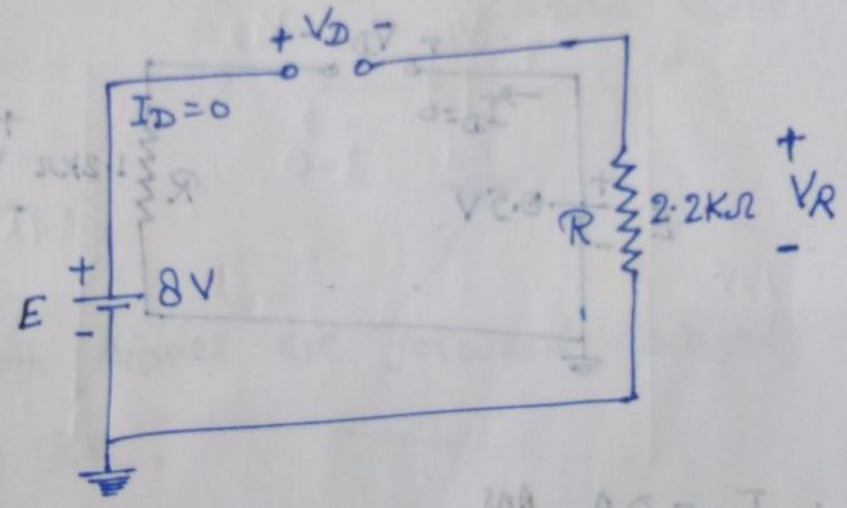
$$\therefore I_D = I_R = \frac{V_R}{R} = \frac{7.3V}{2.2K\Omega}$$

$$\cong \underline{3.32mA} \text{ Ans.}$$

Q. For the following circuit, determine V_D, V_R and I_D



Soln Here diode is 'OFF'. Then



$I_D = 0A$ Ans

$\therefore I_D = I_R = 0$

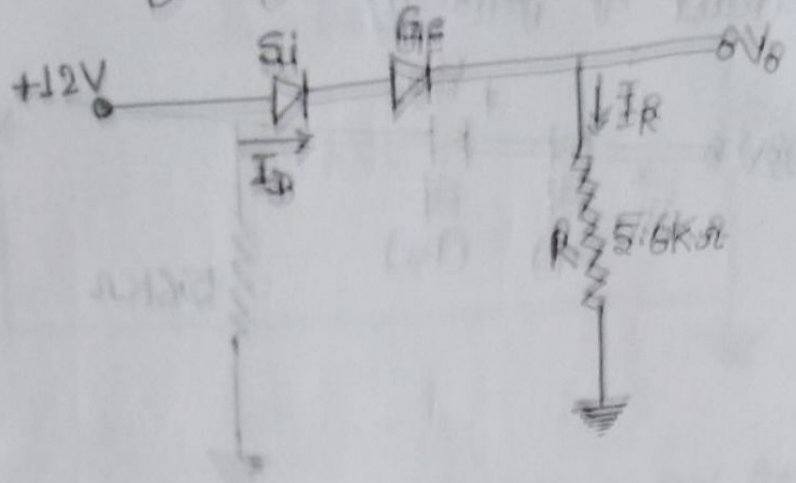
$\therefore V_R = I_R \cdot R = 0V$ Ans.

Now, apply KVL around the closed loop -

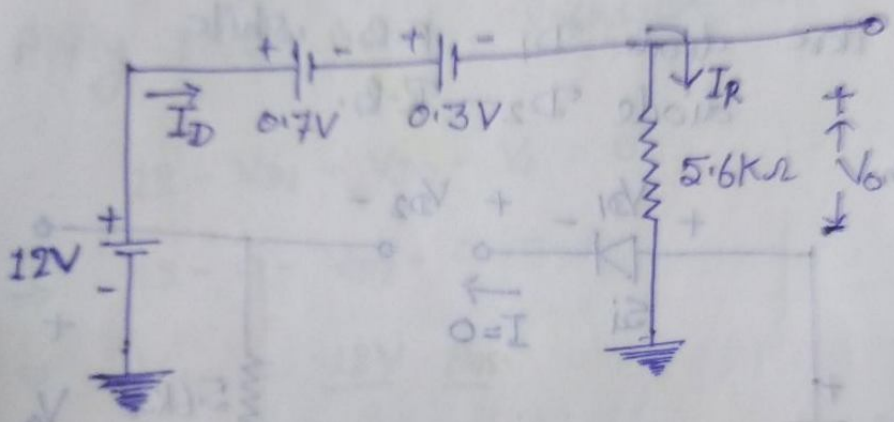
$$E - V_D - V_R = 0$$

$$\therefore V_D = E - V_R = E - 0 = E = 8V \text{ Ans.}$$

Q. Determine V_o and I_D for the series ckt. of following fig.



Sol^n



Here both diodes are forward biased

Apply KVL,

$$12 - 0.7 - 0.3 - V_o = 0$$

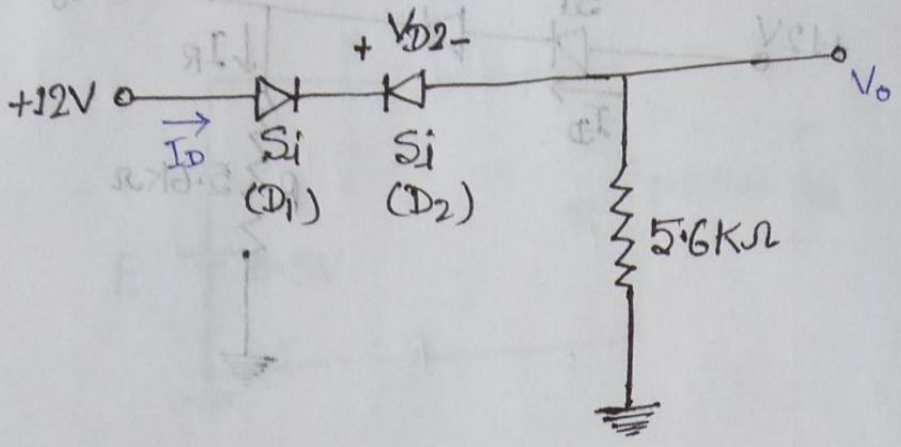
$$\Rightarrow V_o = 11\ V \quad \text{Ans.}$$

and current,

$$I_D = I_R = \frac{V_o}{R} = \frac{11\ V}{5.6K\Omega}$$

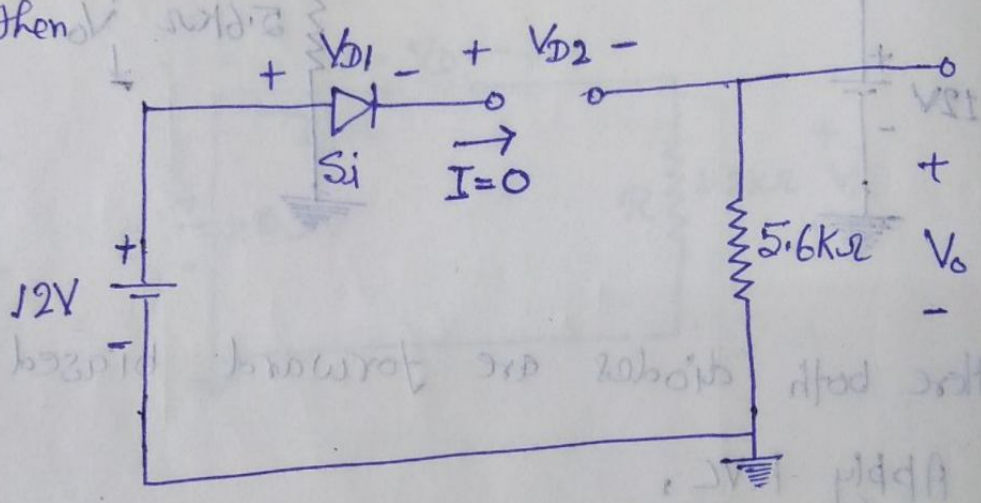
$$\simeq 1.96\ mA \quad \text{Ans.}$$

Q. Determine I_D, V_{D2} and V_o for the circuit of following –



Soln - Here diode D_1 – F.B. while diode D_2 – R.B.

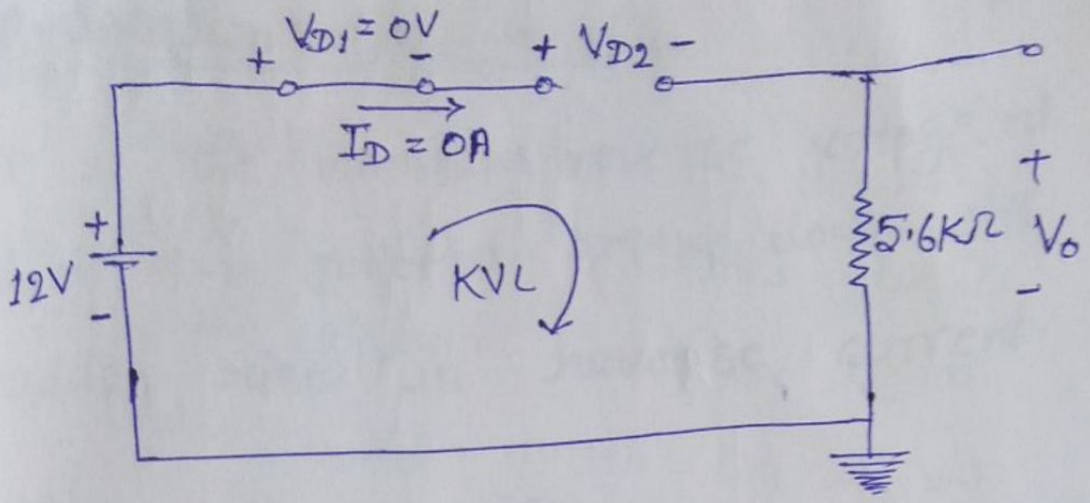
Then



Since the combination of a short circuit in series with an open circuit always results in an open circuit and

$I_D = \underline{0A}$. Ans

$\therefore V_{D1} = 0V$



$\therefore V_o = I_R \cdot R = I_D \cdot R = (0A) \cdot R = \underline{0V}$ Ans.

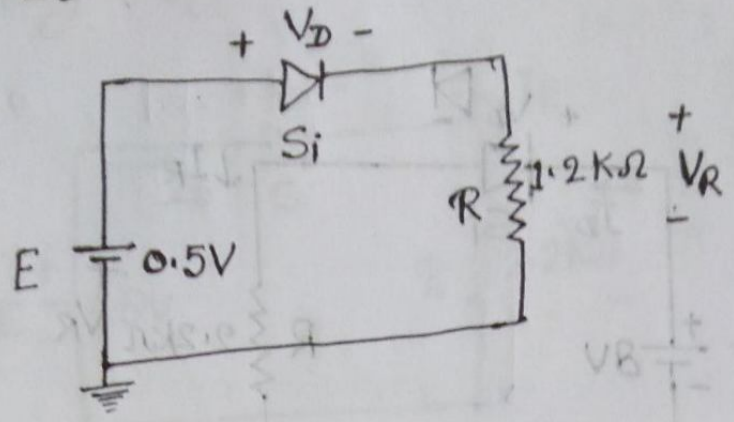
Apply KVL in a clockwise direction, we get -

$$12 - V_{D1} - V_{D2} - V_o = 0$$

$$\Rightarrow \quad 12 - 0 - V_{D2} - 0 = 0$$

$$\Rightarrow \quad V_{D2} = \underline{12V} \text{ Ans.}$$

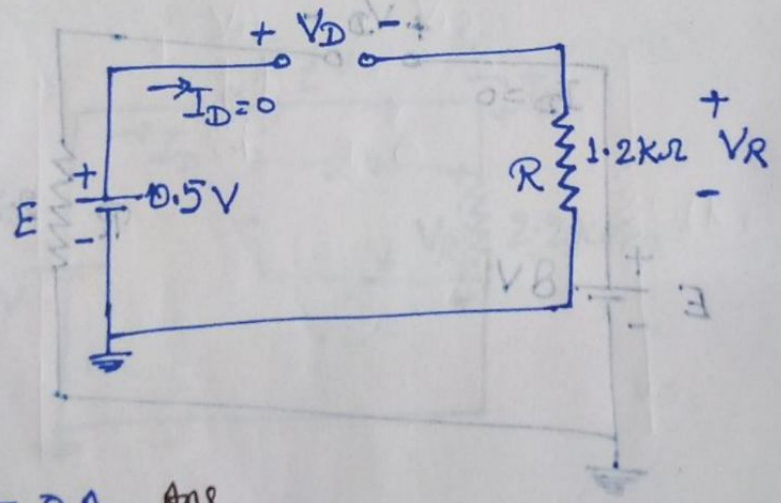
Q. For the following ckt, determine V_D, V_R and I_D.



Sol^n- Here $E < 0.7V$

i.e. $0.5V < 0.7V$

Hence, diode is in 'OFF' state



$\therefore I_D = 0A$ Ans

$\therefore I_R = 0A$

$\therefore V_R = I_R \cdot R = 0V$ Ans

and

$V_D = E = 0.5V$ Ans