

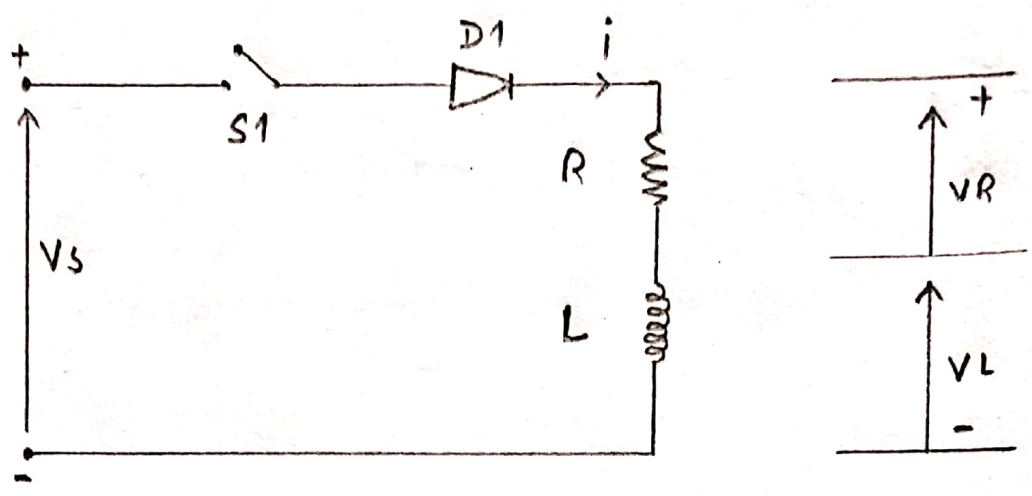
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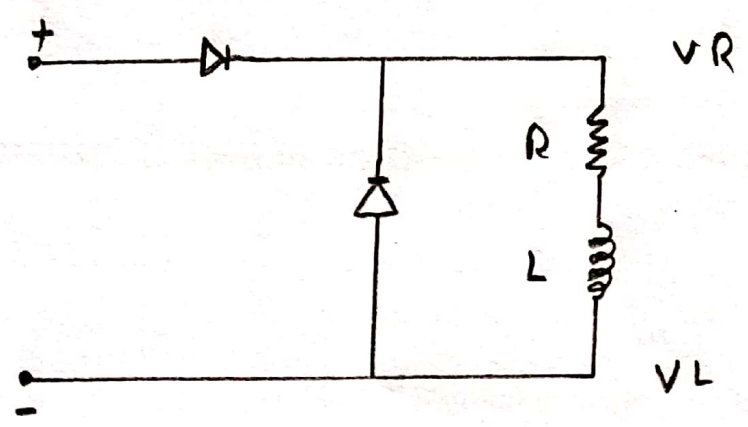
Subject ≠ Power Electronics

Submitted To ≠ Engr Sir Shayan Jan.

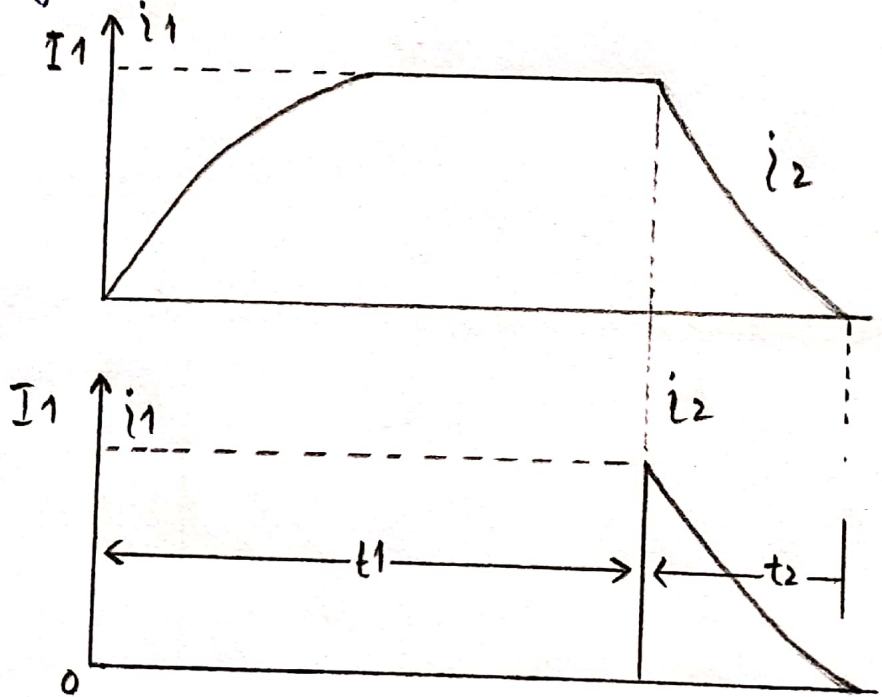
Question: 1 (A)-



When a diode connected in RL circuit, During positive, the inductor become energized because the function is the inductor to store energy. when the positive cycle is started. The inductor become deenergized and creation of the decay current and high voltage take place.



When a freewheeling diode is connected in parallel with RL circuit. During negative diode, the inductor become deenergized. And freewheeling diode will provide path to the decay current to avoid from any damage.



Wave Form

Where RL circuit, there is no need of the freewheeling diode and have no impact on the circuit.

Question: 1 (B) -

$$V_T = 1V$$

$$V_{DS} = 22V$$

$$V_{GS} = ?$$

For saturated mode;

$$V_{DS} = V_{GS} - V_T$$

$$V_{GS} = V_{DS} + V_T$$

$$V_{GS} = 22 + 1$$

$$\boxed{V_{GS} = 23V}$$

Question: 2 (A)-

- ⇒ A switch rate of the appliance will be low because BJT have lower switching rate, then MOSFET become bad performance.
- ⇒ On high frequency, BJT are less efficient that also effect on the performance.
- ⇒ BJT can't operate on high frequency also impact on its performance.
- ⇒ Losses will be low because, Losses in BJT less than MOSFET is of the important advantage of BJT in appliance.
- ⇒ Switching losses will increase because of the BJT in appliance
- ⇒ Conduction losses decreases in BJT Performance improve.
- ⇒ ON state voltage low for BJT, so the efficiency of the appliance decreased.

Question: 2 (B)-

- ⇒ SCR can handle more power, voltage and current which increase the efficiency of the appliance.
- ⇒ SCR have no capability to handle high frequency that is the one of the impact on its performance.
- ⇒ SCR can protected because of the Rise, which can decrease losses used as switch the performance will be improve.

Question: 3

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$$V_{CC} = 122 \text{ V}$$

$$R_C = 22 \text{ V}$$

$$V_B = 10 \text{ V}$$

$$V_{CE} = 1 \text{ V}$$

$$V_{BE} = 1.5 \text{ V}$$

Find;

⇒ a) - Mode = ?

The mode of operation of the transistor.

So, The transistor as switch.

⇒ b) - $R_B = ?$

As, we know that;

$$I_{CS} = \frac{V_{CC} - V_{CE}}{R_C}$$

$$I_{CS} = \frac{122 - 1}{22}$$

$$I_{CS} = 5.5 \text{ A}$$

Now, we know that;

$$I_{BS} = \frac{I_{CS}}{\beta F (\text{min})}$$

$$I_{BS} = \frac{5.5}{8} = 0.6875 \text{ A}$$

So, also we know;

$$I_B = ODF \times I_{BS}$$

$$I_B = 0.6875 \times 5$$

$$I_B = 3.4375 \text{ A}$$

Then, we know

$$R_B = \frac{V_B - V_{BE}}{I_B}$$

$$R_B = \frac{10 - 1.5}{3.4375}$$

$$R_B = 2.4747 \Omega$$

$$\Rightarrow \text{c) - } \beta \text{ Force} = I_{CS} / I_B$$
$$= \frac{5.5}{3.4375} = 1.6 \Omega$$

$$\Rightarrow \text{d) - } P_T = ?$$

$$P_T = V_{BE} I_B + V_{CE} I_C$$

$$P_T = (3.4375)(1.5) + (1)(5.5)$$

$$P_T = 28.3593 \text{ W}$$