

1. What is power electronics?
2. What is the function of power electronics circuit?
3. What are the main factors which decide the choice of power device for a given application?
4. What do you understand by semi-controlled switch and fully-controlled switch.
5. What factors limit the switching speeds of power device?
6. What are the important features of the following types of power device:
 - (a) MOSFET
 - (b) BJT
 - (c) SCR
7. Explain what do you understand by the safe operating area (SOA) of power device.
8. What makes the power MOSFET generally the best choice for dc-dc converters application?
9. What makes the IGBT generally the best choice for dc-ac converters application?
10. Why a snubber circuit is usually required for the power BJT?
11. Why a snubber circuit is usually not required for the power MOSFET?
12. Why the power device needs a base/gate driver?
13. What are the important features of the power BJT base driver?
14. What are the important features of the power MOSFET gate driver?
15. Why a power MOSFET requires a simple gate/base driver compared to a power BJT?
16. A MOSFET device has a total gate charge Q_g of 640 nC. What is the gate current required to achieve a typical turn-on time of 80 ns.
17. If the gate current to drive the MOSFET in E16 is 5A, what is the required turn-on time.
18. The turn-on and turn-off current and voltage waveform on a transistor switch are shown in Fig. E17. The transistor also has an on-state drop 1.5 V, a leakage current of $2\mu\text{A}$. The transistor is operating at a switching frequency of 20 kHz and a duty cycle of 40%. Find the total losses in the transistor.

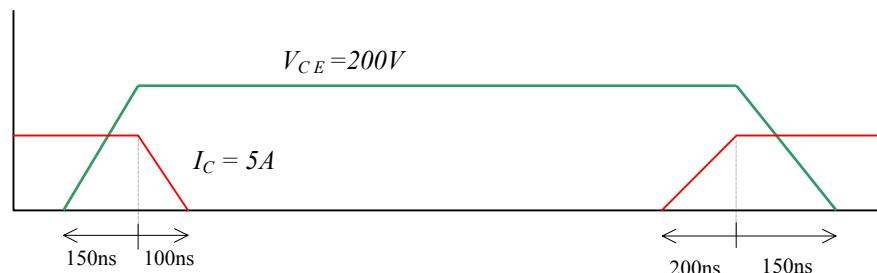


Fig. E17

19. If the average power loss in the transistor in E18 is limited to 20 W, what is the maximum switching frequency that can be achieved.