Sub.-Power Electronics

4th Sem. EE

BTEE-403-18

Short answer type Questions-

1. Why IGBT is very popular nowadays?
2. What are the different methods to turn on the thyristor
3. What is the difference between power diode and signal diode?
4. Power BJT is a current controlled device. Why?
5. How can a thyristor be turned-off
6. Define latching current & holding current.
7. Define P-N junction diode.
8. What is the effect of using free-wheeling diode in single phase rectifiers?
9. In a BJT why is $\alpha<1$ and $\beta>1$?
10. List out the various thyristor commutation techniques.
11. Write a brief note on natural commutation of thyristor.
12. Draw RC firing triggering circuit
13. Define cut-in voltage and PIV in context with power diodes.
14. What is duty cycle?
15. If T is time period of a chopper and α is duty cycle, then what will be chopping frequency
16. What are the advantages of freewheeling diodes in a controlled rectifier?
17. Discuss some of the applications of controlled rectifier.
18. What is the role of an Inductor in any circuit?
19. Find the output voltage expressions for Buck- Converter with Vs as the input voltage and α is the duty cycle.
20. What is an inverter?
21. Is the inverter used in High Voltage DC transmission lines
22. How can you classify inverters based upon the nature of input source?
23. Name the power switches which can be used in inverter?
24. The single phase half bridge inverter has a resistive load of 20 ohm and the centre tap dc input voltage is 60 V. Compute RMS value and fundamental component of output voltage.
25. For single phase full bridge inverter with resistive load, what is the formula to determine fundamental output voltage ($E_{0\,(fund)}$) and n^{th} harmonic voltage ($E_{0\,(n)}$)?
26. What is THD and how it is calculated?
27. What is difference between VSI and CSI?
28. Write the two possible ways of controlling output voltage by internal control of inverter.
29. What do you mean by pulse width modulation (PWM)?
30. What are commonly used PWM control techniques?
31. What is *carrier frequency ratio* (M_f)?
32. Does M_f always greater than or equal to 1?

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33. What is modulation index (M) of inverters? Can it be more than unity?

34. What are advantages of PWM techniques?

35. Give the relation between distortion factor (DF) and M.

36. Write the condition for DF to be maximum.

37. Write the formula for harmonic factor (HF).When it's 100%?

38. What are Two Conduction Modes of three phase inverters?

39. Does any problem of 180 degree conduction mode overcome in 120 degree conduction mode?

Long answer type questions-

1.Describe the different modes of operation of a thyristor with the help of its static VI characteristics..Show latching current and holding current on VI characteristics.

2.Draw VI characteristics of IGBT. Compare it with MOSFET.

3.What is the advantage of using RC firing circuit over Resistance firing circuit. Draw the circuit diagram of RC firing circuit with explanation.

4..What do you mean by 'COMMUTATION' of a thyristor.Describe Voltage and Current commutation of a thyristor.

5.Draw the V-I characteristics of a diode giving the Universal Diode equation

6.A single- phase half wave SCR circuit feeds power to a resistive load.Draw waveforms for source voltage, load voltage, load current and voltage across the SCR for a given firing angle. Hence obtain expressions for average and rms load voltages in terms of source voltage and firing angle.

7.Explain the effect of freewheeling diode in 1-phase half wave controlled converters. How freewheeling diode improves the power factor of the system.

8.Explain the single phase full wave controlled rectifier with RL load . Illustrate your answer with relevant waveforms.

9. A three phase full converter is connected to a resistive load.Find out the expression for average output voltage. Sketch the relevant waveforms.

10. With necessary circuit and waveforms, explain the principle of operation of threephase controlled bridge rectifier feeding R-L load and derive the expression for the average output dc voltage.Also draw input current waveshapes and output voltage waveforms for $\alpha = 30_0$(R load) .

11.For boost converter, duty cycle is varying in the range of 0 to 1, explain the range of variation of output voltage Eo w.r.t. duty cycle.

12.Explain the effect of freewheeling diode in 1-phase half wave controlled converters. How freewheeling diode improves the power factor of the system.

13. Draw and explain the power circuit of a Buck converter with analysis of its wave forms.