

## Power switching devices

1. Draw internal construction of SCR, MOSFET and IGBT with static V-I characteristics.
2. With diagram explain Gate drive circuits for MOSFET and IGBT.
3. Draw and explain RC triggering circuit for SCR.
4. Explain IGBT with construction and characteristics.
5. Enlist various commutation circuit of SCR. Explain any one voltage commutation circuit.
6. Explain series operation of SCR, also derive the expression for static equalizing resistor.
7. Draw and explain the triggering circuits for series connected SCRs.
8. Explain static and switching characteristic of thyristor in detail.
9. With two transistor analogy explain physics of thyristor.
10. Draw and explain various firing circuits for thyristors.
11. State the comparison between SCR, MOSFET and IGBT.

## DC-DC converters - Switching Voltage Regulators

1. List the application of DC choppers.
2. Explain the basic principle of DC Chopper.
3. Explain voltage commutated DC Chopper with necessary waveform and circuit diagram.
4. Derive an expression of output voltage for boost chopper.
5. Explain the voltage control methods for DC Chopper.
6. Compare Linear voltage regulator with Switching voltage regulator.
7. What is chopper? Explain load voltage control.
8. What do you mean by continuous conduction mode and discontinuous conduction mode of operation in choppers
9. Explain jone's chopper in short.
10. Write brief note on buck-boost converter.
11. Give difference between voltage and current commutated choppers.
12. With necessary diagram explain various control strategy for chopper.
13. With neat circuit diagram and waveform explain operation of Boost converter in continuous conduction

mode. Derive the relation between input and output voltage of this converter.

14. With circuit diagram and waveform explain operation of Buck-Boost converter in continuous conduction mode. Derive the relation between input and output voltage of this converter.
15. With circuit diagram and waveform explain working of Forward converter. Derive the relation between input and output voltage.
16. What do you mean by isolated converter? With circuit diagram and waveform explain working of Flyback converter. Derive the relation between input and output voltage.
17. Explain the multi-quadrant operation of DC-DC converter.

### DC-AC converters – Inverters

1. With neat circuit diagram and waveforms; explain 1-phase half bridge inverter with RL Load. Derive the instantaneous voltage equation of the output of this inverter.
2. A single phase full bridge inverter is connected to a dc source of  $V_s$ . Resolve the output voltage wave shape into Fourier series.
3. Explain the performance parameters of the inverter.
4. List out the methods to control voltage of inverter and explain sine PWM in detail.
5. Explain 3 phase inverter operation for 180 degree conduction mode.
6. Explain 3 phase inverter operation for 120 degree conduction mode.
7. Comparison between 120 and 180 degree conduction mode.
8. Explain hysteresis band current control PWM techniques for voltage source inverter.
9. State at least two reasons to control or eliminate the harmonics in inverters? Enumerate different techniques to eliminate harmonics in inverter.
10. Give advantages of PWM inverter.
11. Sketch unipolar and bipolar PWM technique.
12. Explain concept of selective harmonic elimination technique. Write equations using which third and fifth harmonics can be eliminated from the inverter output voltage.
13. What is the third harmonic injection method for PWM techniques? What are merits of it over sine wave PWM?
14. What is space vector modulation? Explain the working principle of SVM(Space Vector Modulation).

## AC-DC Converters

1. List the applications of AC-DC Converters.
2. Discuss about the effect of source and load inductance for ac to dc converter.
3. Draw the circuit diagram and waveform for single phase fully controlled rectifier with RLE load
4. Derive the equation of output voltage for single phase full-wave controlled rectifier with RL load.
5. With diagram and waveform explain working of single phase half-wave and full-wave ac-dc converter.
6. Explain significance of freewheeling diode in controlled rectifiers.
7. Draw necessary waveforms and explain working of single phase full controlled rectifier circuit with R-L load.
8. Explain the working of 1-phase and 3-phase half controlled rectifier (Semi-converter) with R load.
9. Briefly explain the working of dual converter with suitable diagram.
10. Explain the working of rectifier in conversion and inversion mode.
11. Enlist the methods to improve the power factor.

## AC Voltage Controller

1. Explain the TRIAC characteristic and its operating mode in detail.
2. Explain the principle of phase control with neat diagram and waveform. Explain its merits and demerits.
3. Explain the principle of Integral cycle control with neat diagram and waveform. Explain its merits and demerits.
4. With circuit diagram and waveform explain 1-phase ac voltage controller with R load and derive equation of output rms voltage.
5. With circuit diagram and waveform explain 3-phase ac voltage controller with R load and derive equation of output rms voltage.
6. Comparison between Phase control and on-off control of ac voltage regulator.
7. State the various three phase ac voltage regulator configurations.

## Miscellaneous

1. Describe the working of Cycloconverter with necessary diagram and waveform.
2. Explain the operating principle of Matrix Converter.
3. Enlist the types of protections to be provided to the circuits and explain any two in details.
4. What is Electro Magnetic Interference) EMI? How does it affect the operation of any circuit and explain the methods to prevents it.
5. Explain the snubber circuits and parameters to design them.
6. What is snubber circuit? Explain working and application for same.

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